INSTRUCTIONS

1. DO NOT OPEN THIS EXAM UNTIL YOU ARE TOLD TO DO SO.

2. CAREFULLY MARK YOUR STUDENT ID ON YOUR SCANTRON.

3. This exam has 7 pages, including the cover sheet. There are 18 multiple-choice questions, each worth 5 points, and 2 workout questions, worth a total of 10 points. No partial credit will be given on the multiple choice questions.

4. You will have 60 minutes to complete the exam. No notes or books are allowed.

5. TI-30Xa and TI-30XIIS scientific calculators are allowed. NO other calculators are allowed.

6. When you are finished, check your work carefully. Then, slide your scantron inside the exam packet before returning the exam to YOUR instructor.

USEFUL FORMULAS

- \( y = mx + b \)
- \( y - y_1 = m(x - x_1) \)
- \( A^2 - B^2 = (A + B)(A - B) \)
- \( A^3 + B^3 = (A + B)(A^2 - AB + B^2) \)
- \( A^3 - B^3 = (A - B)(A^2 + AB + B^2) \)
- \( x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \)
- \( d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \)
- \( \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \)
- \( I = Prt \)
- \( A = P + Prt \)
- \( a^2 + b^2 = c^2 \)
- \( (x - h)^2 + (y - k)^2 = r^2 \)
1. A function is given by \( f(x) = 2x^2 - x + 3 \). Find \( f(5a) \)

- (a) \( 10a^2 - 5a + 3 \)
- (b) \( 10a^2 - x + 3 \)
- (c) \( 50a^2 - 5a + 3 \)
- (d) \( 100a^2 - 5a + 3 \)
- (e) \( 50a^2 - 5a \)

\[
\begin{align*}
\hspace{4cm} \\
\therefore f(5a) &= 2(5a)^2 - 5a + 3 \\
&= 2 \cdot 25a^2 - 5a + 3 \\
&= 50a^2 - 5a + 3
\end{align*}
\]

2. Solve and give your answer in interval notation: \(-1 < \frac{1}{4}(2m + 2) \leq 13\)

- (a) \([-3, 25]\)
- (b) \((-3, 11]\)
- (c) \((-2, 25]\)
- (d) \((-2, 11]\)
- (e) \((-6, 22]\)

\[
\begin{align*}
\text{\(\therefore -4 < 2m + 2 \leq 52\)} \\
\text{\(-6 < 2m \leq 50\)} \\
\text{\(-3 < m \leq 25\)}
\end{align*}
\]

3. Find the slope of the line with the given equation: \(3x + 2y = 10\)

- (a) \(m = 2\)
- (b) \(m = -\frac{3}{2}\)
- (c) \(m = 3\)
- (d) \(m = \frac{3}{2}\)
- (e) \(m = -\frac{2}{3}\)

\[
\begin{align*}
\text{\(2y = -3x + 10\)} \\
\text{\(y = -\frac{3}{2}x + 5\)} \\
\text{\(m = -\frac{3}{2}\)}
\end{align*}
\]

4. Determine if the following relation is a function and determine the domain of the relation: \{\((-5, 3), (-2, 3), (0, 4), (5, 2)\}\)

- (a) It is a function. The domain is \{-5, -2, 0, 5\}
- (b) It is not a function. The domain is \{-5, -2, 0, 5\}
- (c) It is a function. The domain is \{2, 3, 4\}
- (d) It is not a function. The domain is \{2, 3, 4\}
- (e) Cannot be determined
5. Factor $6x^2 + 17x + 5$ completely. One of the factors is:

(a) $(6x + 5)$

(b) $(3x + 5)$

(c) $(2x + 1)$

(d) $(2x + 5)$

(e) Cannot be factored

\[
\text{Product: } 6 \cdot 5 = 30 \quad \text{Sum: } 17
\]

\[
x^2 + 2x + 15x + 5
\]

\[
2x(3x + 1) + 5(3x + 1)
\]

\[
(2x + 5)(3x + 1)
\]

6. Write an equation for the line passing through the point $(4,4)$ with slope $m = 0$.

(a) $x = 4$

(b) $x = 8$

(c) $y = 8$

(d) $y = 4$

(e) $y = x$

7. Find the equation of the line passing through the points $(2, -3)$ and $(0, 5)$.

(a) $y = 4x + 5$

(b) $y = -2x + 5$

(c) $y = 2x + 5$

(d) $y = -4x$

(e) $y = -4x + 5$

\[
m = \frac{5 - (-3)}{0 - 2} = \frac{8}{-2} = -4
\]

\[
y = -4x + 5
\]

8. Truman the tiger makes an investment at 4% simple interest. At the end of 1 year, the total value of the investment is $1200. How much was originally invested?

(a) $1153.85$

(b) $857.14$

(c) $1250.00$

(d) $1160.00$

(e) Cannot be determined

\[
A = P + Prt
\]

\[
1200 = P + P \cdot 0.04
\]

\[
1200 = 1.04P
\]

\[
P = \frac{1200}{1.04}
\]

\[
P = 1153.85
\]
9. Solve and give your answer in interval notation: \(10 - 6y \geq 8y - 4\)

(a) \((-\infty, 1]\)
(b) \([-1, \infty)\)
(c) \((-\infty, -1]\)
(d) \([1, \infty)\)
(e) \((-\infty, \infty)\)

10. Find the \(x\)-intercept of the line \(2x + 3y = 18\)

(a) \((6, 0)\)
(b) \((9, 0)\)
(c) \((0, 6)\)
(d) \((0, 9)\)
(e) \((0, 0)\)

11. The perimeter of a rectangular field is \(320\) yd. The length is \(20\) yd longer than the width. Find the length of the field.

(a) \(70\) yd
(b) \(80\) yd
(c) \(140\) yd
(d) \(90\) yd
(e) \(60\) yd

12. Perform the indicated operations and simplify: \((3x^2 + 2xy - 7y^2 + 2) - (9x^2 - 4xy + 2y^2 - 1)\)

(a) \(-6x^2 - 2xy - 9y^2 + 3\)
(b) \(-6x^2 + 6xy - 9y^2 + 3\)
(c) \(-6x^2 - 2xy - 5y^2 + 1\)
(d) \(12x^2 + 6xy - 9y^2 + 3\)
(e) \(12x^2 - 2xy - 5y^2 + 1\)
13. Factor $xy + 2x - y - 2$ completely. One of the factors is:

(a) $(y - 2)$
(b) $(y - 1)$
(c) $(y + 1)$
(d) $(x + 1)$
(e) $(x - 1)$

14. Find the domain of the rational expression: $\frac{x + 2}{x^2 - 2x - 15}$

(a) $x \neq -3, -2, 5$
(b) $x \neq -2, 3, 5$
(c) $x \neq -5, 3$
(d) $x \neq -3, 2, 5$
(e) $x \neq -3, 5$

15. Perform the indicated operations and simplify: $\frac{6}{x^2 - 16} - \frac{4}{x + 4}$

(a) $\frac{-4x + 22}{(x + 4)(x - 4)}$
(b) $\frac{-4x - 10}{(x + 4)(x - 4)}$
(c) $\frac{2}{x + 4}$
(d) $\frac{4x + 22}{(x + 4)(x - 4)}$
(e) None of the above

16. The diameter of a circle connects the points $(-3, -1)$ and $(5, 5)$. Find the equation of the circle.

(a) $(x - 1)^2 + (y - 2)^2 = 25$
(b) $(x + 1)^2 + (y - 2)^2 = 25$
(c) $(x - 1)^2 + (y + 2)^2 = 25$
(d) $(x + 1)^2 + (y + 2)^2 = 25$
(e) $(x - 1)^2 + (y - 2)^2 = 5$
17. Find an equation of a circle having radius 5 and center \((3, -7)\)

(a) \((x - 3)^2 + (y - 7)^2 = 25\)
(b) \((x + 3)^2 + (y - 7)^2 = 25\)
(c) \((x + 3)^2 + (y + 7)^2 = 25\)
(d) \((x - 3)^2 + (y + 7)^2 = 25\)
(e) \((x - 3)^2 + (y - 7)^2 = 5\)

\[
(x - 3)^2 + (-\sqrt{25} - (-7))^2 = 5^2
\]
\[
(x - 3)^2 + (y + 7)^2 = 25
\]

18. Find the zeroes of \(y = 4 - \frac{5}{3}x\).

(a) \(x = -\frac{12}{5}\)
(b) \(x = \frac{20}{3}\)
(c) \(x = \frac{12}{5}\)
(d) \(x = -\frac{3}{5}\)
(e) \(x = 0\)

\[
0 = 4 - \frac{5}{3} \cdot x
\]
\[
\frac{5}{3}x = 4
\]
\[
x = 4 \cdot \frac{3}{5}
\]
\[
x = \frac{12}{5}
\]

Workout Section:

19. Write the equation for a line that passes through \((-2, 6)\) and is perpendicular to the line \(y - 2x - 9 = 0\).

(a) Find the slope of the given line.

\[
m = 2
\]

(b) Find the slope of the perpendicular line.

\[
m_1 = -\frac{1}{2}
\]

(c) Write the equation of the perpendicular line.

\[
y - 6 = -\frac{1}{2} (x - (-2))
\]
\[
y - 6 = -\frac{1}{2} (x + 2)
\]
\[
y - 6 = -\frac{1}{2} \cdot x - 1
\]
\[
y = \frac{1}{2} \cdot x + 5
\]
20. Kara’s Custom Tees experienced fixed costs of $400 and variable costs of $5 a shirt. Write an equation that can be used to determine the total expenses encountered by Kara’s Custom Tees. Let \( x \) be the number of shirts, and let \( C(x) \) be the total cost of producing \( x \) shirts. Then, calculate the cost of producing 9 shirts.

(a) Write the equation.

\[
C(x) = 400 + 5x
\]

(b) Calculate the cost of producing 9 shirts.

\[
C(9) = 400 + 5 \times 9
\]

\[
C(9) = 400 + 45
\]

\[
C(9) = 445
\]

\[\boxed{\$445}\]
INSTRUCTIONS

1. DO NOT OPEN THIS EXAM UNTIL YOU ARE TOLD TO DO SO.

2. CAREFULLY MARK YOUR STUDENT ID ON YOUR SCANTRON.

3. This exam has 7 pages, including the cover sheet. There are 18 multiple-choice questions, each worth 5 points, and 2 workout questions, worth a total of 10 points. No partial credit will be given on the multiple choice questions.

4. You will have 60 minutes to complete the exam. No notes or books are allowed.

5. TI-30Xa and TI-30XIIS scientific calculators are allowed. NO other calculators are allowed.

6. When you are finished, check your work carefully. Then, slide your scantron inside the exam packet before returning the exam to YOUR instructor.

USEFUL FORMULAS

- \( y = mx + b \)
- \( y_1 = m(x - x_1) \)
- \( A^2 - B^2 = (A + B)(A - B) \)
- \( A^3 + B^3 = (A + B)(A^2 - AB + B^2) \)
- \( A^3 - B^3 = (A - B)(A^2 + AB + B^2) \)
- \( d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \)
- \( \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \)
- \( (x - h)^2 + (y - k)^2 = r^2 \)
- \( x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \)
- \( A = P + Prt \)
- \( a^2 + b^2 = c^2 \)
- \( f(x + h) - f(x) \)
- \( \frac{h}{h} \)
- \( d = rt \)
- \( f(x) = a(x - h)^2 + k \)
- \( \left( \frac{b}{2a}, f \left( \frac{-b}{2a} \right) \right) \)
Multiple Choice Section:

1. Solve and write your answer in interval notation: \( |10 - 5x| \geq 20 \).
   
   (a) \((-\infty, -2]\)
   
   \[
   10 - 5x \geq 20 \quad \text{or} \quad 10 - 5x \leq -20
   \]
   
   (b) \((-\infty, -2] \cup [6, \infty)\)
   
   \[
   -5x > 10 \quad \text{or} \quad -5x \leq -30
   \]
   
   (c) \([-2, 6]\)
   
   \[
   x \leq -2 \quad \text{or} \quad x > 6
   \]
   
   (d) \((-\infty, \infty)\)
   
   (e) \((-\infty, -6] \cup [2, \infty)\)

2. Describe how the function \( y = (x - 4)^2 + 8 \) can be obtained from one of the basic graphs.
   
   (a) Start with the graph of \( y = x^2 \) and shift the graph left 8 units and up 4 units.
   
   (b) Start with the graph of \( y = x^2 \) and shift the graph right 4 units and down 8 units.
   
   (c) Start with the graph of \( y = x^2 \) and shift the graph left 4 units and up 8 units.
   
   (d) \( y = x^2 \) and shift the graph right 4 units and up 8 units.
   
   (e) Start with the graph of \( y = x^2 \) and shift the graph right 8 units and down 4 units.

3. Given that \( f(x) = -3x + 3 \) and \( g(x) = -2x^3 + 2 \), find \( (f \circ g)(-5) \).
   
   (a) \(-81\)
   
   \[
   g(-5) = -2(-5) - 2 = -2(-125) + 2
   \]
   
   \[
   = 250 + 2 = 252
   \]
   
   (b) \(-750\)
   
   (c) \(-3003\)
   
   \[
   f(g(-5)) = -3(252) + 3
   \]
   
   \[
   = -756 + 3 = -753
   \]
   
   (d) \(-756\)
   
   (e) \(-753\)

4. Determine whether the function \( f(x) = x^3 - 2x + 7 \) is even, odd, or neither.
   
   (a) Even
   
   \( f(-x) = (-x)^3 - 2(-x) + 7 = -x^3 + 2x + 7 \)
   
   (b) Odd
   
   \( f(-x) \neq f(x) \) not even
   
   (c) Neither
   
   odd : \[ -f(x) = -(x^3 - 2x + 7) = -x^3 + 2x - 7 \]
   
   \[ -f(x) \neq f(-x) \] odd
5. Determine the interval(s) on which the function is decreasing.

(a) $(-6, -4)$ and $(0, 4)$
(b) $(2, 2)$
(c) $(-6, -6)$
(d) $(4, -6)$ and $(2, -4)$
(e) $(-4, 0)$

6. Given that $f(x) = 5x - 1$ and $g(x) = -6x^2 + 7x - 9$, find $(f \circ f)(-1)$.

(a) $-1$
(b) $-6$
(c) $-7$
(d) $-31$
(e) $-30$

7. Solve: $9 - |x + 5| = 1$.

(a) $x = -13, 3$
(b) $x = -13$
(c) $x = -3, 13$
(d) $x = 3$
(e) $x = -8, 8$

8. Solve: $x^3 - 16x = 0$.

(a) $x = -16, 16$
(b) $x = -4, 4$
(c) $x = 0, 4$
(d) $x = 0, 16$
(e) $x = -4, 0, 4$
9. Find \( h(-7) + h(-5) + h(4) \), given the function \( h(x) = \begin{cases} -3x - 9 & \text{for } x < -5 \\ 3 & \text{for } -5 \leq x < 1 \\ 2x + 5 & \text{for } x \geq 1 \end{cases} \)

(a) 28
\[
h(-7) = -3(-7) - 9 = 21 - 9 = 12
\]
\[
h(-5) = 3
\]
\[
h(4) = 2(4) + 5 = 8 + 5 = 13
\]
\[
12 + 3 + 13 = 28
\]

(b) -8
\[
h(-5) = 3
\]
\[
h(4) = 2(4) + 5 = 8 + 5 = 13
\]
\[
12 + 3 + 13 = 28
\]

(c) 31

(d) 4

(e) -28

10. (3.4) Solve: \( x - \sqrt{x + 49} = -7 \).

(a) \( x = -13 \)
\[
(x + 3)^2 = (\sqrt{x + 49})^2
\]
\[
x = -3
\]
\[
x + 13 = 0
\]

(b) \( x = -13, 0 \)
\[
\checkmark \text{ for } x = -13
\]
\[
\checkmark \text{ for } x = 0
\]

(c) \( x = 0 \)
\[
\checkmark \text{ for } x = -13
\]
\[
\checkmark \text{ for } x = 0
\]

(d) \( x = -13 \)
\[
\checkmark \text{ for } x = -13
\]
\[
\checkmark \text{ for } x = 0
\]

(e) \( x = 7 \)

11. Determine whether the graph of \( 5 = 3x^4 + y \) is symmetric with respect to the x-axis, y-axis, or the origin.

(a) x-axis
\[
\text{not a}
\]

(b) y-axis
\[
\text{not a}
\]

(c) x-axis and y-axis
\[
\text{not a}
\]

(d) Origin
\[
\text{not a}
\]

(e) x-axis, y-axis, and origin
\[
\text{not a}
\]

12. Find the vertex of the function \( g(x) = -x^2 - 6x + 3 \)

(a) Maximum: \((-3, 12)\)
\[
-\frac{b}{2a} = -\frac{-6}{2(-1)} = \frac{6}{-2} = -3
\]

(b) Minimum: \((-3, 12)\)
\[
\begin{align*}
\text{if } a &< 0 \\
\text{it has a max}
\end{align*}
\]
13. Solve: \( \left( \frac{x + 4}{2} + \frac{x - 9}{3} \right) = 4 \)

(a) \( x = \frac{7}{5} \)
(b) \( x = \frac{5}{7} \)
(c) \( x = \frac{12}{5} \)
(d) \( x = \frac{5}{12} \)
(e) \( x = 3 \)

\[ \frac{3}{2} \cdot \frac{(x + 4)}{2} + \frac{2}{3} \cdot \frac{(x - 9)}{3} = 1 \cdot 6 \]

\[ 3(x + 4) + 2(x - 9) = 6 \]
\[ 3x + 12 + 2x - 18 = 6 \]
\[ 5x = 6 \]
\[ x = \frac{6}{5} \]

14. Describe in words how the graph of \( g(x) = 5(x - 1)^2 \) can be obtained from the graph of \( f(x) = x^2 \).

(a) Shifted right one unit, and stretched vertically by a factor of 5.

(b) Shifted left one unit, and stretched vertically by a factor of 5.

(c) Shifted right one unit, and shrunk vertically by a factor of \( \frac{1}{5} \).

(d) Shifted left one unit, and shrunk vertically by a factor of \( \frac{1}{5} \).

(e) Shifted left five units, and shrunk vertically by a factor of \( \frac{1}{5} \).

15. Determine the relative **maxima** in the following function.

(a) \( (0, 1) \)
(b) \( (1, 2) \)
(c) \( (2, 0) \)
(d) \( (-1, 0) \)
(e) \( (-2, 2) \)

16. Given that \( g(x) = x - 3 \) and \( h(x) = x^2 - 1 \), find \( (h - g)(x) \).

(a) \( -x^2 + x - 2 \)
(b) \( x^2 + x + 4 \)
(c) \( x^2 - 2x - 2 \)
(d) \( x^2 - x + 2 \)
(e) \( x^2 - 2x - 4 \)

\[ (h - g)(x) = x^2 - 1 - (x - 3) \]
\[ = x^2 - 1 - x + 3 \]
\[ = x^2 - x + 2 \]
17. Determine if the function $f(x) = x^2 - 12x + 32$ has a maximum or a minimum. Indicate its coordinate.

(a) Maximum: $-4$

(b) Minimum: $-4$

(c) Maximum: $-6$

(d) Minimum: $-6$

(e) Minimum: $6$

18. Find the axis of symmetry of the function $g(x) = -x^2 - 8x + 5$

(a) $x = 4$

(b) $x = -4$

(c) $x = -8$

(d) $x = 8$

(e) $x = 5$

---

**Workout Section:**

19. Solve and write your answer in interval notation: $|3 - 7x| \leq 4$.

\[-4 \leq 3 - 7x \leq 4\]

\[-7 \leq -7x \leq 1\]

\[-\frac{1}{7} \geq x \geq \frac{1}{7}\]

\[\frac{1}{7} \leq x \leq \frac{1}{7}\]

\[\left[-\frac{1}{7}, \frac{1}{7}\right]\]
20. Consider the function \( f(x) = 5 - 3x^2 \).

(a) Find \( f(x + h) \)

\[
f(x + h) = 5 - 3(x + h)^2
= 5 - 3(x^2 + 2xh + h^2)
= 5 - 3x^2 - 6xh - 3h^2
\]

(b) Construct and simplify the difference quotient \( \frac{f(x + h) - f(x)}{h} \) for the function \( f(x) = 5 - 3x^2 \).

\[
\frac{f(x + h) - f(x)}{h} = \frac{5 - 3x^2 - 6xh - 3h^2 - (5 - 3x^2)}{h}
= \frac{-6xh - 3h^2}{h}
= -6x - 3h
\]

<table>
<thead>
<tr>
<th></th>
<th>Multiple Choice</th>
<th>Workout</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points</td>
<td>90</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Score</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
INSTRUCTIONS

1. DO NOT OPEN THIS EXAM UNTIL YOU ARE TOLD TO DO SO.

2. CAREFULLY MARK YOUR STUDENT ID ON YOUR SCANTRON.

3. This exam has 7 pages, including the cover sheet. There are 18 multiple-choice questions, each worth 5 points, and 2 workout questions, worth a total of 10 points. No partial credit will be given on the multiple choice questions.

4. You will have 60 minutes to complete the exam. No notes or books are allowed. TI-30Xa and TI-30XIIS scientific calculators are allowed. NO other calculators are allowed.

5. When you are finished, check your work carefully. Then, slide your scantron inside the exam packet before returning the exam to YOUR instructor.

USEFUL FORMULAS

- \( y = mx + b \)
- \( y - y_0 = m(x - x_0) \)
- \( A^2 - B^2 = (A + B)(A - B) \)
- \( A^3 + B^3 = (A + B)(A^2 - AB + B^2) \)
- \( A^3 - B^3 = (A - B)(A^2 + AB + B^2) \)
- \( d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \)
- \( \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \)
- \( (x - h)^2 + (y - k)^2 = r^2 \)
- \( x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \)
- \( I = Prt \)
- \( A = P + Prt \)
- \( a^2 + b^2 = c^2 \)
- \( f(x) = a(x - h)^2 + k \)
- \( \left( -\frac{b}{2a}, f\left( -\frac{b}{2a} \right) \right) \)
- \( \log_a MN = \log_a M + \log_a N \)
- \( \log_a \frac{M}{N} = \log_a M - \log_a N \)
- \( \log_a M^n = n \log_a M \)
- \( \log_a M = \frac{\log_b M}{\log_b a} \)
- \( \log_a a = 1, \quad \log_a 1 = 0 \)
- \( \log_a a^x = x, \quad a^{\log_a x} = x \)
1. Find \( f^{-1}(x) \) given that \( f(x) = 2x - 1 \).

(a) \( f^{-1}(x) = \frac{x - 2}{2} \)

(b) \( f^{-1}(x) = x - 2 \)

(c) \( f^{-1}(x) = \frac{x - 1}{2} \)

(d) \( f^{-1}(x) = \frac{x + 1}{2} \)

(e) \( f(x) \) does not have an inverse.

2. Determine the horizontal asymptote, if any, of the function \( f(x) = \frac{3x^2 - 7}{4x^3 + 1} \).

(a) \( y = \frac{3}{4} \)

(b) \( y = 0 \)

(c) \( y = \frac{4}{3} \)

(d) \( y = -7 \)

(e) There is no horizontal asymptote.

3. Solve and write your answer in interval notation: \( x^2 \geq 8 - 2x \).

(a) \( (-\infty, -4] \cup [2, \infty) \)

(b) \([-4, 2]\)

(c) \([-2, 4]\)

(d) \((-\infty, -2] \cup [4, \infty)\)

(e) No solution

4. Convert the equation \( 8 = \log_a Q \) to an exponential equation.

(a) \( 8^Q = a \)

(b) \( a^Q = 8 \)

(c) \( 8^a = Q \)

(d) \( Q^8 = a \)

(e) \( a^8 = Q \)
5. Express \( \log_a x^3 y^2 z \) as a sum or difference of logarithms.

(a) \( \log_a 3x + \log_a 2y + \log_a z \)

(b) \( 3 \log_a x + 2 \log_a y - \log_a z \)

(c) \( \log_a 3x + \log_a 2y - \log_a z \)

\( \text{(d)} 3 \log_a x + 2 \log_a y + \log_a z \)

(e) \( \log_a (3x + 2y + z) \)

6. Determine the y-intercept of the function \( g(x) = (x - 1)^2(x + 1)^4 \).

\( \chi = \infty \)

(a) \((0, 0)\)

\[ g(0) = (0 - 1)^2 (0 + 1)^4 = (-1)^2 (1)^4 = 1 \]

(b) \((0, -1)\)

(c) \((0, 1)\)

(d) \((1, 0)\)

(e) The function has no y-intercepts

7. Find \( \log_2 \frac{1}{8} \).

(a) \(-2\)

\[ \log_2 \frac{1}{8} = -3 \]

(b) \(-3\)

\[ \frac{-3}{2} = \frac{1}{2^{-3}} = \frac{1}{8} \]

(c) \(\frac{1}{3}\)

(d) \(3\)

(e) 2

8. Use the Intermediate Value Theorem to determine if the function \( f(x) = 5x^3 + 9x^2 - 3x - 4 \) has at least one real zero between \( x = -2 \) and \( x = -1 \).

(a) \( f(-2) \) and \( f(-1) \) have opposite signs, therefore it cannot be determined if the function \( f \) has a real zero between \(-2\) and \(-1\).

(b) \( f(-2) \) and \( f(-1) \) have the same sign, therefore the function \( f \) has a real zero between \(-2\) and \(-1\).

(c) \( f(-2) \) and \( f(-1) \) have opposite signs, therefore the function \( f \) has a real zero between \(-2\) and \(-1\).

(d) \( f(-2) \) and \( f(-1) \) have the same sign, therefore it cannot be determined if the function \( f \) has a real zero between \(-2\) and \(-1\).
9. Identify the end behavior for the function \( P(x) = -x^3 + x^5 - \frac{1}{3}x^6 \).

10. Solve the exponential equation: \( 2^{3x-7} = 32 \).
   
   (a) \( x = 0 \)
   
   (b) \( x = 13 \)
   
   (c) \( x = \frac{11}{4} \)
   
   (d) \( x = 4 \)
   
   (e) \( x = 5 \)

11. Find the real zeros of \( f(x) = x^3 - 2x^2 - 9x + 18 \).
   
   (a) \(-3, 0, 2\)
   
   (b) \(-3, 2, 3\)
   
   (c) \(-2, 2, 3\)
   
   (d) \(-3, -2, 2\)
   
   (e) \(-3, -2, 0\)

12. Find \( \ln \sqrt{e} \).
   
   (a) 1
   
   (b) 0
   
   (c) \( \frac{1}{2} \)
   
   (d) 2
   
   (e) \( e \)
13. Find the maximum number of zeros and the maximum number of turning points that the graph of the function \( f(x) = 9 + x^3 + 5x^2 - 8x^6 \) can have.

(a) Zeros: 7; Turning points: 6

(b) Zeros: 7; Turning points: 8

(c) Zeros: 6; Turning points: 6

(d) Zeros: 6; Turning points: 7

(e) Zeros: 5; Turning points: 5

14. Express \( \ln 54 - \ln 6 \) as a single logarithm and, if possible, simplify.

(a) \( \ln \frac{54}{6} = \ln 9 \)

(b) \( \ln 60 \)

(c) \( \ln 324 \)

(d) \( \ln 9 \)

(e) \( e \)

15. Determine the vertical asymptote(s) of the function \( g(x) = \frac{x + 5}{x^2 + 4x - 32} \).

(a) \( x = -8, \ x = -5, \ x = 4 \)

(b) \( x = -5, \ x = 0 \)

(c) \( x = -5 \)

(d) \( x = -4, \ x = 8 \)

(e) \( x = -8, \ x = 4 \)

16. Convert the equation \( 16 = 2^x \) to a logarithmic equation.

(a) \( \log_2 16 = x \)

(b) \( \log_{16} 2 = x \)

(c) \( \log_2 x = 16 \)

(d) \( \log_{16} x = 2 \)

(e) \( \log_x 2 = 16 \)
17. Determine the horizontal asymptote, if any, of the function \( g(x) = \frac{x^5}{x^2 + 2} \).

(a) \( y = 0 \)

(b) \( y = 1 \)

(c) \( y = \frac{5}{2} \)

(d) \( y = -1 \)

(e) There is no horizontal asymptote

18. Use the Horizontal Line Test to determine whether the function whose graph is shown is one-to-one.

(a) \( f(x) \) is one-to-one

(b) \( f(x) \) is not one-to-one

(c) Cannot be determined

---

**Workout Section: You must show all your work. No work, no credit.**

19. Solve the rational inequality, determine the interval(s) for which the inequality is satisfied, and write your answer in interval notation.

\[
f(x) = \frac{2x}{x - 3} \geq 0
\]
20. Solve for $x$: \[ \log \frac{x}{x+2} = 1. \]

\[ \log_{10} \frac{x}{x+2} = 1 \]

\[ 10^1 = \frac{x}{x+2} \]

\[ 10(x+2) = x \]

\[ 10x + 20 = x \]

\[ 9x = -20 \]

\[ x = -\frac{20}{9} \]

<table>
<thead>
<tr>
<th>Points:</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Multiple Choice</th>
<th>Workout</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points:</td>
<td>90</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Score:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. The points (−5, −4) and (3,3) are the endpoints of the diameter of a circle. Find the length of the radius of the circle.

The length of the radius is ___________.
(Round to the nearest hundredth as needed.)

2. Find the midpoint of the segment with the given endpoints.
   (5, −6) and (7, −4)

   The midpoint is ___________.
   (Type an ordered pair.)

3. Find the standard equation of the circle having the given center and radius.
   Center (8, −1), Radius \( \frac{1}{5} \)

   Choose the correct equation of the circle.
   - A. \((x + 8)^2 + (y - 1)^2 = \frac{1}{5}\)
   - B. \((x - 8)^2 + (y + 1)^2 = \frac{1}{25}\)
   - C. \((x + 8)^2 + (y - 1)^2 = \frac{1}{25}\)
   - D. \((x - 8)^2 + (y + 1)^2 = \frac{1}{5}\)

4. Find the equation for the circle with center (2,4) and passing through (−4,3).

   Write the equation for the circle.
   ___________ (Simplify your answer.)

5. Determine the domain and the range of the relation, and tell whether the relation is a function.

   \{ (1,9), (23, −5), (34,9), (1,5), (49,5) \}

   The domain is { ___________ }.
   (Use a comma to separate answers as needed. Type each answer only once.)

   The range is { ___________ }.
   (Use a comma to separate answers as needed. Type each answer only once.)

   Is this relation a function?
   - No
   - Yes
Given that \( g(x) = \frac{x - 2}{x + 5} \), find each of the following.

\[
\begin{align*}
\text{a)} & \quad g(6) & \quad \text{b)} & \quad g(2) & \quad \text{c)} & \quad g(-5) & \quad \text{d)} & \quad g(-11.75) & \quad \text{e)} & \quad g(x + h)
\end{align*}
\]

\text{a) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.}

- A. \( g(6) = \ldots \) (Simplify your answer.)
- B. \( g(6) \) does not exist.
- C. \( g(6) \) is not a real number.

\text{b) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.}

- A. \( g(2) = \ldots \) (Simplify your answer.)
- B. \( g(2) \) does not exist.
- C. \( g(2) \) is not a real number.

\text{c) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.}

- A. \( g(-5) = \ldots \) (Simplify your answer.)
- B. \( g(-5) \) does not exist.
- C. \( g(-5) \) is not a real number.

\text{d) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.}

- A. \( g(-11.75) = \ldots \) (Type an integer or decimal rounded to three decimal places as needed.)
- B. \( g(-11.75) \) does not exist.
- C. \( g(-11.75) \) is not a real number.

\text{e) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.}

- A. \( g(x + h) = \ldots \) (Simplify your answer.)
- B. \( g(x + h) \) does not exist.
- C. \( g(x + h) \) is not a real number.

7. Watch the video and then solve the problem given below.

\text{Click here to watch the video.} \(^1\)

The graph of the function \( h(x) \) is shown. Find the function values \( h(1), h(3), \) and \( h(4). \)

\[
\begin{align*}
\text{h(1)} &= \\
\text{h(3)} &= \\
\text{h(4)} &= 
\end{align*}
\]

\(^1\): http://mediaplayer.pearsoncmg.com/assets/IgKmsVzLZ7YQXsMb4gjawvZoiRtKrp_S
8. Watch the video and then solve the problem given below.

Click here to watch the video.²

Find the slope and the y-intercept of the line with the equation $3y - x + 2 = 0$.

Select the correct choice below and fill in any answer boxes within your choice.

- A. The slope is _____________. (Type an integer or a simplified fraction.)
- B. The slope is undefined.

Select the correct choice below and fill in any answer boxes within your choice.

- A. The y-intercept is _____________.
  (Type an integer or a simplified fraction. Type an ordered pair.)
- B. There is no y intercept.

2: http://mediaplayer.pearsoncmg.com/assets/agShVVhHaZZZzBZmN3L9M0L5_1aj7I_p

9. Write equations of the horizontal and the vertical lines that pass through the point $(-3, -5)$.

What is the equation of the horizontal line?

- A. $x = -5$
- B. $y = -3$
- C. $x = -3$
- D. $y = -5$

What is the equation of the vertical line?

- A. $x = -5$
- B. $x = -3$
- C. $y = -3$
- D. $y = -5$

10. Decide whether the pair of lines is parallel, perpendicular, or neither.

$3x + 5y = 3$
$5x - 3y = 1$

The lines are (1) ____________

- (1) parallel.
- neither parallel nor perpendicular.
- perpendicular.

11. Watch the video and then solve the problem given below.

Click here to watch the video.³

Write a slope-intercept equation for a line that passes through $(-4,1)$ and $(2, -11)$.

The slope-intercept equation for the line is ______________.
(Simplify your answer. Type an integer or a simplified fraction. Type an equation.)

3: http://mediaplayer.pearsoncmg.com/assets/CZO7VlzCt1_KgXcteQQUXAmR5HEfVzb_
12. Watch the video and then solve the problem given below.

   Click here to watch the video.4

Write a slope-intercept equation for a line passing through the point (12, 14) that is parallel to \( y = \frac{1}{2}x + 20 \). Then write a second equation for a line passing through the given point that is perpendicular to the given line.

Which answer below is correct?

- **A.** parallel: \( y = \frac{1}{2}x + 14 \)  
  perpendicular: \( y = -2x + 14 \)
- **B.** parallel: \( y = \frac{1}{2}x + 8 \)  
  perpendicular: \( y = 2x + 38 \)
- **C.** parallel: \( y = \frac{1}{2}x + 8 \)  
  perpendicular: \( y = -2x + 38 \)

4: http://mediaplayer.pearsoncmg.com/assets/68nDQz_kXn_87yXIf6djfxO6mDFXeNyn

13. Money is borrowed at 18% simple interest. After one year, $1033.68 pays off the loan. How much was originally borrowed?

The amount of the original loan was $\_\_\_\_.

14. To finance her community college education, Sarah takes out a loan for $2200. After a year Sarah decides to pay off the interest, which is 6% of $2200. How much will she pay?

Sarah will pay $\_\_\_.

15. Watch the video and then solve the problem given below.

   Click here to watch the video.5

Solve.

\[
22 - \frac{4}{7}x = -\frac{4}{7}x + 22
\]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** \( x = \_\_\_\_\_ \) (Type an integer or a simplified fraction.)
- **B.** The solution is all real numbers.
- **C.** There is no solution.

5: http://mediaplayer.pearsoncmg.com/assets/1poCToXvH3R7zoCmUPA_zWqE_7tRH42x
16. Watch the video and then solve the problem given below.

Click here to watch the video.⑥

Solve and graph the compound inequality.

\[-3 < x + 3 < 14\]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ A. The solution set in interval notation is ____________.
○ B. There is no solution.

Choose the graph of the solution set.

○ A.  
○ B.  
○ C.  
○ D.  

6: http://mediaplayer.pearsoncmg.com/assets/k7pBLudxZ3DGhmyLLzCUjRqJLv_Ug_rG

17. Watch the video and then solve the problem given below.

Click here to watch the video.⑦

Solve and write interval notation for the solution set. Then graph the solution set.

\[2x \leq -14 \quad \text{or} \quad x - 4 > 0\]

Select the correct choice below and fill in any answer boxes in your choice.

○ A. The solution set is ____________.
   (Type your answer in interval notation. Use integers or fractions for any numbers in the expression.)
○ B. There is no solution.

Choose the correct graph below.

○ A.  
○ B.  
○ C.  
○ D.  
○ E.  
○ F.  

7: http://mediaplayer.pearsoncmg.com/assets/pdWpQf1mwLVlJ_0kKRtjQy5tBEA0QkoU
18. Determine any relative maxima or minima of the function and the intervals on which the function is increasing or decreasing.

\[ f(x) = -x^2 + 9x - 16 \]

Does the function have a relative maximum or minimum?

- Relative minimum
- Relative maximum

The relative maximum occurs at \( x = \) _________ and has a value of _________.

On what interval is the function increasing?

- A. \((4.25, \infty)\)
- B. \((-\infty, 4.5)\)
- C. \((-\infty, 4.25)\)
- D. \((4.5, \infty)\)

On what interval is the function decreasing?

- A. \((4.5, \infty)\)
- B. \((4.25, \infty)\)
- C. \((-\infty, 4.25)\)
- D. \((-\infty, 4.5)\)

19. For the piecewise function, find the values \( h(-9) \), \( h(0) \), \( h(5) \), and \( h(8) \).

\[
h(x) = \begin{cases} 
-2x - 20, & \text{for } x < -5 \\
5, & \text{for } -5 \leq x < 5 \\
x + 3, & \text{for } x \geq 5 
\end{cases}
\]

\[ h(-9) = \] 
\[ h(0) = \] 
\[ h(5) = \] 
\[ h(8) = \]
20. Watch the video and then solve the problem given below.

Click here to watch the video.¹

Determine the intervals on which the function is increasing, decreasing, and constant.

List the interval(s) on which the function is increasing.

(Type your answer in interval notation. Use a comma to separate answers as needed.)

List the interval(s) on which the function is decreasing.

(Type your answer in interval notation. Use a comma to separate answers as needed.)

List the interval(s) on which the function is constant.

(Type your answer in interval notation. Use a comma to separate answers as needed.)

8: http://mediaplayer.pearsoncmg.com/assets/LnBpAkF3Nnbgizym67r55pNKVxfI1Mvb

21. Given that \( h(x) = x + 1 \) and \( g(x) = \sqrt{x - 7} \), find \((g + h)(7)\), if it exists.

Select the correct choice below and fill in any answer boxes within your choice.

- A. \((g + h)(7) = \) ______________
- B. The function is undefined.

22. Watch the video and then solve the problem given below.

Click here to watch the video.²

Given that \( h(x) = x + 4 \) and \( g(x) = \sqrt{x - 2} \), find \((g + h)(2)\), if it exists.

Select the correct choice below and fill in any answer boxes within your choice.

- A. \((g + h)(2) = \) ______________
- B. The function is undefined.

9: http://mediaplayer.pearsoncmg.com/assets/Dc5CoOa3eTs9xNdOq4EhUPRc3e1OGXR
23. Watch the video and then solve the problem given below.

The expression \( \frac{f(x + h) - f(x)}{h} \) for \( h \neq 0 \) is called the difference quotient. Find and simplify the difference quotient for the following function.

\[ f(x) = 9x^2 + 2x + 6 \]

The difference quotient is ___________.
(Simplify your answer.)

24. Find \((f \circ g)(x)\) and \((g \circ f)(x)\) and the domain of each.

\[ f(x) = x + 3, \quad g(x) = 2x^2 - 5x - 3 \]

\((f \circ g)(x) = \) ___________ (Simplify your answer.)

The domain of \((f \circ g)(x)\) is ___________. (Type your answer in interval notation.)

\((g \circ f)(x) = \) ___________ (Simplify your answer.)

The domain of \((g \circ f)(x)\) is ___________. (Type your answer in interval notation.)

25. Given that \(f(x) = 2x + 4\) and \(g(x) = x^2 - 3x - 5\), find \((g \circ f)(7)\). 

\((g \circ f)(7) = \) ___________ 
(Simplify your answer.)

26. Determine the symmetries (if any) of the graph of the given relation.

\[ 6x^4 + 5 = y^2 \]

Choose the correct symmetry or symmetries of the graph.

- A. x-axis, y-axis, and origin
- B. x-axis only
- C. origin only
- D. x-axis and y-axis only


27. Watch the video and then solve the problem given below.

Click here to watch the video.¹³

Determine whether the function is even, odd, or neither.

\[ f(x) = 6x^5 - 5x^3 \]

Which term describes the function? Choose the correct answer below.

- **A.** odd
- **B.** even
- **C.** neither

13: http://mediaplayer.pearsoncmg.com/assets/1Vrhag7c9kSJ_Rk6Ut_OtgxI88VMt5v_

---

28. Describe how the given function can be obtained from one of the basic graphs. Then graph the function.

\[ g(x) = (x + 1)^2 - 5 \]

Describe how the given function can be obtained from one of the basic graphs.

Start with the graph of \( f(x) = \) \_

(1) \_

1 unit and then shift it

(2) \_

5 units.

Use the graphing tool to graph the equation.

(1) \_ right \_ left \_ up \_ down

(2) \_ down \_ right \_ left \_ up
29. Consider the quadratic function below and (a) find the vertex; (b) find the axis of symmetry; (c) determine whether there is a maximum or a minimum value, and find that value; and (d) graph the function.

\[ f(x) = x^2 + 7x + 12 \]

(a) The vertex occurs at \( (\_\_\_, \_\_\_\_) \).
   (Type an ordered pair, using integers or fractions.)

(b) Find an equation for the axis of symmetry.
   \( \_\_\_\_\_\_ \) (Type an equation. Use integers or fractions for any numbers in the equation.)

(c) Determine whether the parabola has a maximum or a minimum and find its value.

Select the correct choice below and fill in the answer box to complete your choice.
   (Type an integer or a fraction.)

- A. The parabola opens downward and has a maximum value of \( \_\_\_\_\_\_ \).
- B. The parabola opens upward and has a minimum value of \( \_\_\_\_\_\_ \).

(d) Use the graphing tool on the right to graph the function.

30. For the function below, (a) find the vertex; (b) find the axis of symmetry; (c) determine whether there is a maximum or a minimum value and find that value; and (d) graph the function.

\[ f(x) = -x^2 - 10x - 18 \]

(a) The vertex is \( (\_\_\_, \_\_\_\_) \).
   (Type an ordered pair, using integers or fractions.)

(b) The axis of symmetry is \( \_\_\_\_\_\_ \).
   (Type an equation. Use integers or fractions for any numbers in the equation.)

(c) Does \( f(x) \) have a maximum or a minimum value?
   - The parabola has a maximum value.
   - The parabola has a minimum value.

   The minimum/maximum value is \( \_\_\_\_\_\_ \).
   (Type an integer or a fraction.)

(d) Use the graphing tool to graph the function.
31. Solve.

\[ \frac{4}{x + 3} = \frac{6}{x} \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution(s) is/are \[ \text{__________} \].
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

- **B.** The solution set is \( \{x \mid x \text{ is a real number and } x \neq \text{__________} \} \).
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

- **C.** There is no solution.

32. Watch the video and then solve the problem given below.

[Click here to watch the video.]

Solve.

\[ \sqrt{x + 49} + 7 = x \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution(s) is/are \[ \text{__________} \].
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

- **B.** There is no solution.

33. Watch the video and then solve the problem given below.

[Click here to watch the video.]

Solve.

\[ |x + 9| + 4 = 32 \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution(s) is/are \[ \text{__________} \].
  (Simplify your answer. Type an integer or a fraction. Use a comma to separate answers as needed.)

- **B.** There is no solution.
34. Watch the video and then solve the problem given below.

Click here to watch the video.  

Solve the following inequality and write interval notation for the solution set. Then graph the solution set.

\[ |x + 6| < 4 \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is _______.
  (Type your answer in interval notation.)
- B. There is no solution.

Choose the correct graph below.

A. \[ \quad \]
B. \[ \quad \]
C. \[ \quad \]
D. \[ \quad \]
E. \[ \quad \]
F. \[ \quad \]

16: http://mediaplayer.pearsoncmg.com/assets/ffwIntYnqaTfVeWjmvOLIUT_TzKGVQ6V

35. Watch the video and then solve the problem given below.

Click here to watch the video.  

Solve.

\[ |x + 6| \geq 8 \]

Select the correct choice below and fill in any answer boxes in your choice.

- A. The solution set is _______.
  (Simplify your answer. Type your answer in interval notation.)
- B. There is no solution.

Choose the correct graph of the solution set.

A. \[ \quad \]
B. \[ \quad \]
C. \[ \quad \]
D. \[ \quad \]

17: http://mediaplayer.pearsoncmg.com/assets/ojE7cbCzW_LMeNYTnJlR5Hy0Z0jDChn4
36. Choose the end behavior diagram that best describes the function.

\[ f(x) = -3.9x^4 + x^6 + 0.6x^7 \]

Choose the correct diagram below.

- [ ] **A.**
- [ ] **B.**
- [ ] **C.**
- [ ] **D.**

37. Find the zeros of the polynomial function, and state the multiplicity of each.

\[ f(x) = (x + 3)^2(x - 4) \]

The zeros are ___________.

(Use a comma to separate answers.)

- 3 has multiplicity ___________.
- 4 has multiplicity ___________.

38. Find the zeros of the function, and their multiplicities.

\[ f(x) = x^3 - 4x^2 - x + 4 \]

The zeros of the function are \( x = \) ___________.

(Use a comma to separate answers as needed.)

Each zero has multiplicity ___________.

39. For the function \( f(x) = x^{11} - 2x^2 + 6x - 5 \), state:

a) the maximum number of real zeros that the function can have;
b) the maximum number of x-intercepts that the graph of the function can have; and
c) the maximum number of turning points that the graph of the function can have.

The function \( f(x) = x^{11} - 2x^2 + 6x - 5 \) has a maximum of ___________ real zeros.

The function \( f(x) = x^{11} - 2x^2 + 6x - 5 \) has a maximum of ___________ x-intercepts.

The function \( f(x) = x^{11} - 2x^2 + 6x - 5 \) has a maximum of ___________ turning points.
40. Using the intermediate value theorem, determine, if possible, whether the function \( f \) has at least one real zero between \( a \) and \( b \).

\[ f(x) = x^3 + 2x^2 - 6x - 4; \ a = -5, \ b = -1 \]

Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

- A. By the intermediate value theorem, the function does not have at least one real zero between \( a \) and \( b \) because \( f(a) = \ldots \) and \( f(b) = \ldots \). (Simplify your answers.)
- B. By the intermediate value theorem, the function has at least one real zero between \( a \) and \( b \) because \( f(a) = \ldots \) and \( f(b) = \ldots \). (Simplify your answers.)
- C. It is impossible to use the intermediate value theorem in this case.

41. List the domain and the \( x \)- and \( y \)-intercepts of the following function. 

\[ f(x) = \frac{-5}{x-6} \]

The domain of the function is \ldots . (Type your answer in interval notation.)

What is/are the \( x \)-intercept(s) of the function? Select the correct choice below, and if necessary, fill in the answer box to complete your choice.

- A. The \( x \)-intercept(s) of the function is/are \ldots . (Use a comma to separate answers as needed. Type an ordered pair.)
- B. The function has no \( x \)-intercepts.

What is the \( y \)-intercept of the function? Select the correct choice below, and if necessary, fill in the answer box to complete your choice.

- A. The \( y \)-intercept of the function is \ldots . (Type an ordered pair.)
- B. The function has no \( y \)-intercept.

Find any vertical asymptotes. Select the correct choice below, and if necessary, fill in the answer box to complete your choice.

- A. The vertical asymptote(s) is/are \ldots . (Use a comma to separate answers as needed. Type an equation.)
- B. The graph has no vertical asymptotes.

Find any horizontal asymptotes. Select the correct choice below, and if necessary, fill in the answer box to complete your choice.

- A. The horizontal asymptote is \ldots . (Type an equation.)
- B. The graph has no horizontal asymptote.

42. Find the domain of the rational expression.

\[ f(x) = \frac{-3}{x^2 + 2x - 24} \]

The domain is \ldots . (Type your answer in interval notation.)
43. Determine the vertical asymptotes of the graph of the function.

\[ g(x) = \frac{x^3}{4x^3 - x^2 - 5x} \]

\[ x = \quad \text{(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)} \]

44. Determine the horizontal asymptote of the graph of the function.

\[ f(x) = \frac{2x^2 + 3}{5x^2 - 3} \]

Select the correct choice below and fill in any answer boxes within your choice.

- A. The horizontal asymptote is \( y = \quad \text{(Type an integer or a simplified fraction.)} \)
- B. There is no horizontal asymptote.

45. Determine the horizontal asymptote of the graph of the following function.

\[ f(x) = \frac{x^2 - 5}{3x^4 + 7} \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The horizontal asymptote is \( y = \quad \text{(Type an integer or a fraction.)} \)
- B. There is no horizontal asymptote.

46. Watch the video and then solve the problem given below.

Click here to watch the video. \(^{18}\)

Solve the following inequality.

\[ x^2 - 15x + 44 > 0 \]

The solution is \( \quad \text{.} \)

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed.)

\(^{18}\) http://mediaplayer.pearsoncmg.com/assets/Qm23SBI3_TXPuFNz9eP2jLmBXb3mmHE4
47. Watch the video and then solve the problem given below.

Click here to watch the video.¹⁹

Solve.

\[ x^2 - 5x - 11 \geq x - 4 \]

The solution set is ___________.

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed.)

19: http://mediaplayer.pearsoncmg.com/assets/Msq7yl0Sk5eLizLeXg87VKblvcBR9p2W

48. Watch the video and then solve the problem given below.

Click here to watch the video.²⁰

Solve.

\[ 2x^3 - 3x^2 \leq 9x \]

The solution set is ___________. (Type your answer in interval notation.)

20: http://mediaplayer.pearsoncmg.com/assets/XmykXNur7lBGLnH3FY1ukBtJNWr2tWuX

49. Watch the video and then solve the problem given below.

Click here to watch the video.²¹

Solve.

\[ \frac{8x}{x + 9} \geq 0 \]

The solution set is ___________.

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression. Type an exact answer, using radicals as needed.)

21: http://mediaplayer.pearsoncmg.com/assets/s85EW3bOor07afFETqLI_UQGusjkP38

50. Find the inverse of the relation.

\{(0, 5), ( -7, -1), ( -2, 9), (5, -5)\}

The inverse is \{___________\}.

(Type ordered pairs, separated by commas.)
51. Determine whether the function is one-to-one. If it is, find a formula for its inverse.

\[ f(x) = 5x - 2 \]

Is the function one-to-one?
- No
- Yes

Find a formula for the inverse if it exists. Select the correct choice below and fill in any answer boxes within your choice.

- \( A. \) \( f^{-1}(x) = \frac{-1}{5} \) (Simplify your answer.)
- \( B. \) There is no inverse function.

52. Use the graph of \( f(x) \) to determine whether the function is one-to-one. If it is, find a formula for its inverse.

\[ f(x) = \frac{x + 6}{x - 5} \]

Is the function one-to-one?
- Yes
- No

Select the correct choice below and fill in the answer box within your choice if necessary.

- \( A. \) The inverse function is \( f^{-1}(x) = \) \[ \text{ } \] (Simplify your answer.)
- \( B. \) The function is not one-to-one.

53. Find the logarithm.

\[ \log_2 16 \]

54. Find the logarithm.

\[ \log_5 \frac{1}{125} \]

55. Convert to a logarithmic equation.

\[ p^w = 21 \]

The equation is \[ \text{ } \] (Use integers or fractions for any numbers in the equation.)

56. Convert to an exponential equation.

\[ \log_m T = -y \]

The equivalent equation is \[ \text{ } \] (Type in exponential form.)

57. Find the logarithm using the change of base formula.

\[ \log_4 60 \]

(Round to four decimal places as needed.)
58. Express as the sum or difference of logarithms.
\[
\log_3 11w
\]
(Simplify your answer.)

59. Express as a sum of logarithms.
\[
\ln(ab)
\]
Choose the correct answer below.

- A. \( \log a + \log b \)
- B. \( \ln a + \ln b \)
- C. \( b(\ln a) + a(\ln b) \)
- D. \( (\ln a)(\ln b) \)

60. Express \( \frac{\ln s}{n} \) as a difference of logarithms.

Which expression is correct?

- A. \( \ln\frac{s}{n} = \ln s - \ln n \)
- B. \( \ln\frac{s}{n} = \ln s - \ln s \)
- C. \( \ln\frac{s}{n} = \ln s + \ln n \)
- D. \( \ln\frac{s}{n} = \ln s - \ln n \)

61. Rewrite as sums or differences of logarithms.
\[
\log_b (x^6 y^7 z)
\]
\[
\log_b (x^6 y^7 z) =
\]

62. Express \( \log_b \frac{p^2 q^6}{m^3 b^7} \) in terms of sums and differences of logarithms.

Choose the correct answer below.

- A. \( \log_b \frac{p^2 q^6}{m^3 b^7} = \log_b p^2 + 6 \log_b q^6 - \log_b m^3 - 7 \log_b b \)
- B. \( \log_b \frac{p^2 q^6}{m^3 b^7} = 2 \log_b p + 6 \log_b q - 3 \log_b m - 7 \log_b b \)
- C. \( \log_b \frac{p^2 q^6}{m^3 b^7} = 2 \log_b p + 6 \log_b q - 3 \log_b m - 7 \log_b b \)
- D. \( \log_b \frac{p^2 q^6}{m^3 b^7} = 2 \log_b p + 6 \log_b q - 3 \log_b m - 7 \log_b b \)

63. Simplify.
\[
\log_3 (2x + 1)
\]
\[
\log_3 (2x + 1) =
\]
64. Find the indicated value of the logarithmic function.

\[ \ln \left( e^{3x} \right) \]

Choose the correct value of the logarithmic function.

- A. \( e^{\ln(3x)} \)
- B. \( \ln(3x) \)
- C. \( 3x \)
- D. \( e^{3x} \)

65. Solve the exponential equation.

\[ 2^{6x + 2} = 6^x \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution is \( x \approx \) ____________ .
  (Type an integer or decimal rounded to three decimal places as needed.)
- B. The solution is not a real number.

66. Solve for \( x \).

\[ \log_5(2x - 8) = 3 \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution is \( x = \) ____________ .
  (Type an exact answer in simplified form. Use a comma to separate answers as needed.)
- B. The solution is not a real number.

67. Solve for \( x \).

\[ \log x + \log(x + 21) = 2 \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution(s) is/are \( x = \) ____________ .
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- B. The solution is not a real number.

68. Solve for \( x \).

\[ \log_4(x + 1) - \log_4 x = 2 \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution is \( x = \) ____________ .
  (Simplify your answer. Type an integer or a fraction. Use a comma to separate answers as needed.)
- B. The solution is not a real number.
69. Watch the video and then solve the problem given below.

Click here to watch the video.

Solve for x.

\[ 3^{5x - 7} = 81 \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution is \( x = \) ________.
  
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

- **B.** The solution is not a real number.

22: http://mediaplayer.pearsoncmg.com/assets/HOOa_3gSGQItm5k6jhRt6giokQWG7Gtg

70. The Coffee Counter charges $7 per pound for Kenyan French Roast coffee and $6 per pound for Sumatran coffee.

How much of each type should be used to make a 20 pound blend that sells for $6.35 per pound?

The Coffee Counter should mix ________ pounds of Kenyan Roast coffee and ________ pounds of Sumatran coffee to make 20 pounds of a blend that sells for $6.35 per pound.

71. Watch the video and then solve the problem given below.

Click here to watch the video.

Solve using the substitution method.

\[
\begin{align*}
\begin{align*}
 x - y &= -1 \\
 9x + 2y &= -75 \\
\end{align*}
\end{align*}
\]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution of the system is ________.
  
  (Type an ordered pair.)

- **B.** There are infinitely many solutions in the form \( (x, \underline{\quad}) \).

- **C.** There is no solution.

23: http://mediaplayer.pearsoncmg.com/assets/X8P49JNhvNFLwCPOI9Y2vAtPaRcsfSSF
72. Watch the video and then solve the problem given below.

Solve by the elimination method. Also determine whether the system is consistent or inconsistent and whether the equations are dependent or independent.

\[
\begin{align*}
3x - 9y &= 15 \\
2x - 6y &= 10
\end{align*}
\]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** There is only one solution. The solution of the system is ________.
  (Simplify your answer. Type an ordered pair.)
- **B.** There are infinitely many solutions of the form \((x, \underline{\phantom{1}})\).
  (Simplify your answer.)
- **C.** There is no solution.

The system is (1) ________ and its equations are (2) ________

24: http://mediaplayer.pearsoncmg.com/assets/OI0RDaJM_bHd6rSNOfigvE3lZfdUVwnn

(1) ○ inconsistent, (2) ○ independent.
    ○ consistent, ○ dependent.

73. Solve the system of equations.

\[
\begin{align*}
3x + 4y + 3z &= -2 \\
9x + 12y + 9z &= 12 \\
2x - 3y + 4z &= 4
\end{align*}
\]

Select the correct choice below and fill in any answer boxes within your choice.

- **A.** There is one solution. The solution is \((\underline{\phantom{1}}, \underline{\phantom{1}}, \underline{\phantom{1}})\).
  (Type exact answers in simplified form.)
- **B.** There are infinitely many solutions. The solutions are \((\underline{\phantom{1}}, \underline{\phantom{1}}, z)\), where \(z\) is any real number.
  (Type exact answers in simplified form.)
- **C.** There is no solution.

74. Solve the following system of equations.

\[
\begin{align*}
4x + 7y &= 15 \\
8x - 2z &= 14 \\
6y - 2z &= 4
\end{align*}
\]

Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

- **A.** There is one solution. The solution is \((\underline{\phantom{1}}, \underline{\phantom{1}}, \underline{\phantom{1}})\).
  (Type integers or simplified fractions.)
- **B.** There are infinitely many solutions. The solutions are \((\underline{\phantom{1}}, \underline{\phantom{1}}, z)\).
  (Type integers or simplified fractions.)
- **C.** There is no solution.
75. Determine the order of the matrix.

\[
\begin{bmatrix}
-7 & -6 & -8 & 5 & -6 \\
8 & 0 & -1 & 4 & 1 \\
-8 & 7 & -7 & 2 & -6
\end{bmatrix}
\]

What is the order of the matrix?

\[\underline{\text{________} \times \underline{\text{________}}}\]

76. Write an augmented matrix for the following system of equations.

\[
\begin{align*}
8x - 2y + 8z & = -8 \\
5x - 8y + 3z & = 6 \\
5y - 9z & = -2
\end{align*}
\]

The entries in the matrix are:

\[
\begin{bmatrix}
\underline{\text{________}} & \underline{\text{________}} & \underline{\text{________}} & \underline{\text{________}} & \underline{\text{________}} \\
\underline{\text{________}} & \underline{\text{________}} & \underline{\text{________}} & \underline{\text{________}} & \underline{\text{________}}
\end{bmatrix}
\]

77. Write the system of equations that corresponds to the following augmented matrix.

\[
\begin{bmatrix}
4 & -4 & 4 \\
2 & 5 & -3
\end{bmatrix}
\]

What is the first equation?

\[4x - 4y = \underline{\text{________}}\]

What is the second equation?

\[2x + \underline{\text{________}} y = -3\]

78. Solve the following system of equations using Gaussian elimination or Gauss-Jordan elimination.

\[
\begin{align*}
5x + 8y & = -45 \\
-2x + 4y & = 9
\end{align*}
\]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** There is one solution. The solution is \(\underline{\text{________}}\).
  (Simplify your answer. Type an ordered pair)

- **B.** There are infinitely many solutions of the form \((x, \underline{\text{________}})\).
  (Type an expression using x as the variable.)

- **C.** There is no solution.