

MATH 1320 EXAM 1 REVIEW
(Sponsored by the Learning Center)

1. Find the equation of the line parallel to $2x+5y=10$ that passes through $(5,3)$.
2. Find the equation of the line perpendicular to $2x+5y=10$ that passes through $(2,7)$.
3. Write a linear equation that expresses the relationship between temperatures in degrees Kelvin, K , and degrees Fahrenheit, F . Use the fact that water freezes at 273 K (32 F) and boils at 373 K (212 F).

4. Find the domain of $f(x) = \frac{\sqrt{x+6}}{x^2-4}$.

5. Given $f(x) = \frac{3x+2}{x-1}$ and $g(x) = x^2 - 1$, find:

a. $(f+g)(2)$

b. $(f \cdot g)(1)$

c. $\left(\frac{f}{g}\right)(-2)$

d. $(f \circ g)(x)$

e. $(g \circ f)(x)$

f. $f^{-1}(x)$

g. $f(x^2)$

h. $f(x + \Delta x) - f(x)$

i. $\frac{g(x + \Delta x) - g(x)}{\Delta x}$

6. Evaluate the following limits:

a. $\lim_{x \rightarrow 3} (x^2 - 2x + 4)$

b. $\lim_{x \rightarrow -2} \frac{x^2 + 4x + 4}{x^2 - 2x - 8}$

c. $\lim_{x \rightarrow \infty} \frac{3x^2 - 2x + 6}{5 - 4x - 7x^2}$

d. $\lim_{x \rightarrow 1} \frac{\sqrt{x} - 1}{x - 1}$

e. $\lim_{x \rightarrow -\infty} \frac{\sqrt{4x^2 - 2x + 1}}{3x + 5}$

7. Determine the points of discontinuity (if any) for the following functions:

a. $f(x) = 5x^3 + 7x^2 - 11$

b. $f(x) = \frac{x^2 + 1}{x^2 - 3x - 10}$

c. $f(x) = \frac{\sqrt{3x - 2}}{x^2 - 9}$

8. Use the definition of derivative to find the derivatives of the following:

a. $f(x) = x^2 + 2x$

b. $f(x) = \frac{1}{x + 4}$

9. Find the equation of the tangent line to $f(x) = \frac{1}{x + 4}$ at $x = -2$.

10. Find the derivatives of the following functions:

a. $f(x) = \frac{x^2 + 5x - 4}{x}$

b. $g(x) = \sqrt{x} - \frac{1}{\sqrt[3]{x}}$

c. $h(x) = 5x^3 - 13x^2 - 4 + \frac{2}{x}$

d. $f(x) = (x^2 + 4)^2$

e. $y = (x^3 - 1)(2x^2 - x + 1)$

f. $f(x) = \frac{3x^2 - 4x + 7}{x^3 + 7x^2 - 6}$

g. $y = \left(\frac{2x}{x+1}\right)^3$

h. $g(x) = x\sqrt{1 + 4x^2}$

11. Determine the points, if any, at which the graph of the following function has a horizontal tangent line.

$$f(x) = 3x^{5/2} - 25x^{3/2} + 60x^{1/2}$$

12. The height s at time t of a ball dropped from a height of 400 feet is given by $s(t) = -16t^2 + 400$, where s is in feet and t is in seconds.
- When will the ball hit the ground?
 - Find the ball's average velocity during the time that it is falling.
 - Find the ball's velocity at the time it hits the ground.
 - Find the acceleration of the ball.

13. The monthly demand function and cost function for x cans of fruit punch are given by:

$$p = 3 - \frac{x}{100} \quad \text{and} \quad C = 100 + 2x.$$

- Find the monthly revenue as a function of x .
 - Find the monthly profit as a function of x .
 - Find the marginal profit as a function of x .
14. Find the second derivative of $f(x) = x\sqrt{x}$.

15. Find the third derivative of $g(t) = \frac{1}{t}$.