

## Math 1100 Exam Review 2

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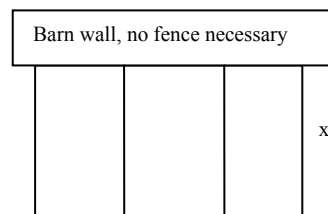
Tuesday, October 20, 2009, in Physics 114

- Functions and Graphs (1.2)
- Linear Functions, Slope, & Applications (1.3)
- Equations of Lines and Modeling (1.4)
- More on Functions (1.5)
- Algebra of Functions (1.6)
- Symmetry and Transformations (1.7)
- Linear Equations, Functions, & Models (2.1)
- Complex Numbers (2.2)
- Quadratic Equations, Functions, & Models (2.3)
- Graphs of Quadratic Functions (2.4)
- More Equation Solving (2.5)
- Solving Linear Equations (2.6)

1. Determine whether each relation represents a function. If so, identify the domain.

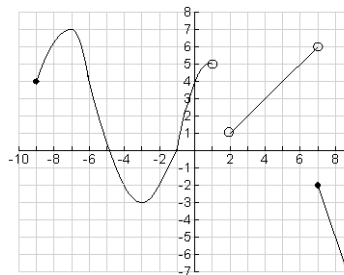
- a.  $\{(1,2), (3,4), (1,5)\}$       b.  $2x + 3y = 12$       c.  $y^2 = 4 - x^2$

2. Find a function of  $x$  to represent the area enclosed in the pen illustrated at right, if 220 yards of fencing is used to construct the pen against the barn.



3. For  $f(x) = \frac{\sqrt{10-x}}{x^2-36}$ , a. find  $f(-2)$  and  $f(1)$       b. Determine the domain of the function  $f(x)$ .

4. Determine the domain and the range of the function  $g(x)$  whose graph is given to the right. Write the domain and range in interval notation, using the union symbol,  $\cup$ , whenever necessary.



5. From the graph in #4, determine the following:

- a)  $g(-4)$     b)  $g(2)$     c)  $g(7)$

d) Find all the  $x$  values such that  $g(x) = 1$ .

6. Find the equation of the line passing through  $(-5, -1)$  and  $(-2, -3)$ .

Express in  $y = mx + b$  form.

7. Find the equation of the line through the point  $(2, -1)$  and perpendicular to  $9x - 3y = 4$ .

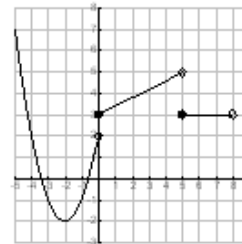
8. a. Find the equation of the horizontal line through the point  $(2, 7)$ .

b. Find the slope of the vertical line through the point  $(3, 4)$ .

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

9. Determine whether the lines are parallel, perpendicular, or neither:  $2x - 6y = 9$  and  $3x - y = 4$ .

10. Graph the piece-wise defined function  $g(x) = \begin{cases} -3x-8, & \text{for } x < -2 \\ \frac{1}{2}x+5, & \text{for } -2 \leq x \leq 4 \\ 10-2x, & \text{for } x > 4 \end{cases}$



11. a. Write an equation for the piecewise function in the graph.  
 b. Indicate the intervals for which the function is increasing, decreasing, or constant.

12. Let  $f(x) = \sqrt{x-5}$  and  $h(x) = \frac{1}{x-6}$ .

- a. Find  $(f/h)(7)$ .                      b. Find  $(h/f)(x)$  and its domain.

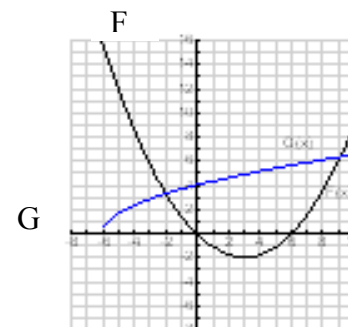
13. Let  $f(x) = \frac{1}{x-4}$  and  $g(x) = \frac{3}{x}$ . Find a.)  $f \circ g(3)$     b.)  $g \circ f(4)$     c.)  $g \circ f(x)$  and its domain.

14. Let  $f(x) = \sqrt{4-x^2}$  and  $g(x) = \sqrt{x+3}$ . Find  $(f \circ g)(x)$  and its domain.

15. Compute and simplify the difference quotient  $\frac{f(x+h)-f(x)}{h}, h \neq 0$  for  $f(x) = \frac{1}{x-6}$ .

16. F(x) and G(x) are represented in the graph to the right. Find:

- a.  $(F + G)(3)$                               b.  $(F \circ G)(10)$   
 c. domain of  $(G / F)(x)$ .                d. graph  $(F-G)(x)$



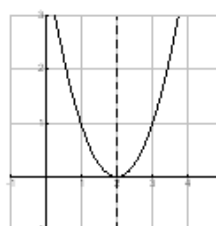
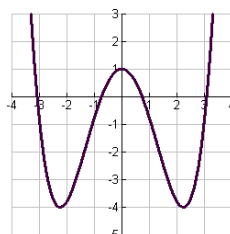
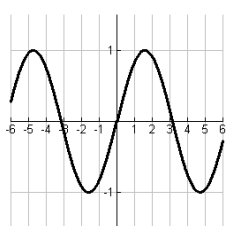
17. Determine algebraically whether the following functions are even, odd, or neither even nor odd.

a.  $r(x) = \frac{4-x^2}{x}$                       b.  $h(x) = 3|x|$                       c.  $f(x) = -5x^3 + 3$

18. Which of the following are symmetric with respect to the x-axis, the y-axis, or the origin ?

a.  $xy - x^2 = 5$                               b.  $y^2 = \frac{x^2 + 3}{x}$

19. Classify the following graphs as even, odd, or neither.



- a.    b.    c.
20. (a) The function  $g(x)$  has the same graph as that of the function  $f(x) = \sqrt{x}$ , stretched vertically by a scaling factor of 2, followed by a reflection about the x-axis, then shifted up by 1 unit. Determine the equation of the function  $g(x)$ .

(b) The function  $h(x)$  has the same graph as that of the function  $f(x) = \frac{1}{x}$ , reflected about the y-axis and then shifted down 3 units. Determine the equation of the function  $h(x)$

(c) The Function  $m(x)$  has the same graph as that of the function  $f(x) = x^2$ , stretched vertically by a factor of  $\frac{1}{2}$ , then shifted right 3 units. . Determine the equation of the function  $m(x)$ .

21. Solve  $Mp = 2n - 0.2p$ , for  $p$ .

22. Cam and Pete are running a 10-km race. Cam runs at 12 kph and Pete runs at 10 kph. In how many minutes will they be  $\frac{2}{3}$  km apart?

23. The population in Howard was 14,200 in 2000. This was a 5% increase from 1995. What was the population in 1995?

24. Calculate                    a.  $(-2 + i) \div (3 - 4i)$                     b.  $i^{39}$

25. Solve: a.  $x^2 = 22 + 10x$                     b.  $2m^2 - 16 = 0$

26. Find the zeros for the function:  $f(x) = 2x^{2/3} + x^{1/3} - 1$ .

27. Add the appropriate constant to complete the square :  $x^2 - \frac{3}{2}x$

28. For the quadratic function,  $f(x) = 2x^2 - 4x + 3$  find:    a) the vertex;    b) the equation of the line of symmetry;  
c) the domain and range;    d) Write the equation in the form  $f(x) = a(x - h)^2 + k$

29. The cost  $C$  in dollars of manufacturing  $x$  scooters at Scooter Productions is given by  $C(x) = 2x^2 - 800x + 92,000$ . Find the number of scooters that must be manufactured to minimize the cost.

30. Solve:  $\frac{8}{x^2 - 2x + 4} = \frac{x}{x + 2} + \frac{24}{x^3 + 8}$

31. Solve:  $\frac{x}{x - 1} - \frac{1}{x + 1} = \frac{2}{x^2 - 1}$

32. Solve:  $\sqrt{5x + 4} - 2 = 1$

33. Solve:  $\sqrt[5]{3x + 4} = 2$

34. Solve:  $|x - 4| + 3 = 9$

35. Solve and write interval notation for the solution set:  $(x + 1)(x + 2) > x(x + 1)$

36. Solve and write interval notation for the solution set:  $|3x + 4| < 13$

**Key:** 1 a. not a function b. Func D:  $(-\infty, \infty)$  c. not a func 2.  $f(x) = x(220 - 4x)$

3. a.  $f(-2) = -\sqrt{3}/16$ ;  $f(1) = -3/35$  b. D:  $(-\infty, -6) \cup (-6, 6) \cup (6, 10]$

4. D:  $[-9, 1) \cup (2, \infty)$  R:  $(-\infty, 7]$  5. a. -2; b. undef; c. -2; d.  $x = -1$  or  $-5$  6.  $y = \frac{-2}{3}x - \frac{13}{3}$  7.  $y = \frac{-1}{3}x - \frac{1}{3}$

8. a.  $y = 7$  b. undef c.  $x = -3$

9. neither 10. see below 11. a.  $y = \begin{cases} (x+2)^2 - 2 & -\infty < x < 0 \\ \frac{2}{5}x + 3 & 0 \leq x < 5 \\ 3 & 5 \leq x < 8 \end{cases}$  11.b. Incr:  $(-2, 5)$ ; decr:  $(-\infty, -2)$ ; Const:  $[5, 8)$

12. a.  $\sqrt{2}$  b.  $\frac{1}{(x-6)\sqrt{x-5}}$ ; D:  $(5, 6) \cup (6, \infty)$  13. a.  $-1/3$ ; b. undefined c.  $3(x-4)$ ; D:  $(-\infty, 4) \cup (4, 0)$

14.  $\sqrt{1-x}$ ; D:  $[-3, 1]$  15.  $\frac{-1}{(x-6)(x+h-6)}$  16. a. 3 b. 0 c.  $(\infty, 0) \cup (0, 6) \cup (6, \infty)$  d. see below

17. a. odd; b. even; c. neither 18. a. origin; b. x-axis 19. a. odd; b. even; c. neither

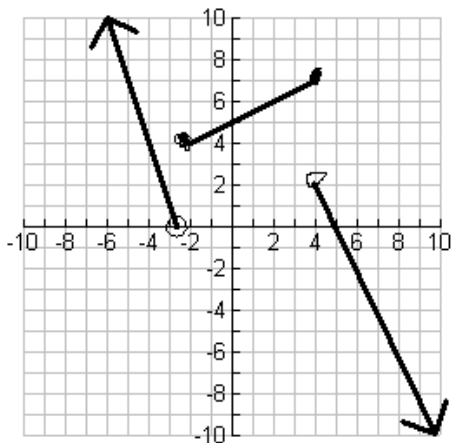
20. (a).  $g(x) = -2\sqrt{x} + 1$  (b)  $h(x) = -(1/x) - 3$  (c).  $m(x) = \frac{1}{2}x^2 + 3$  21.  $p = 2n/(M + 0.2)$  22. 1/3 hr or 20

mins. 23. 13524 24. a.  $\frac{-2}{5} - \frac{1}{5}i$ ; b.  $-i$

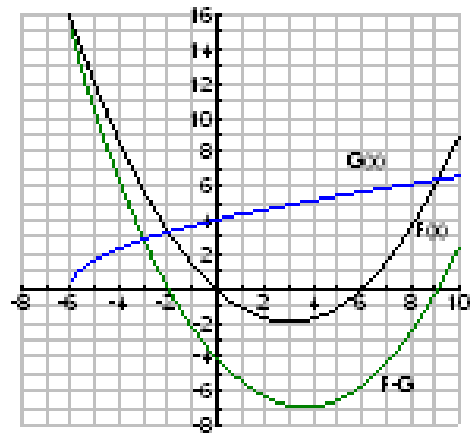
25. a.  $x = 5 \pm \sqrt{47}$  b.  $m = \pm 2\sqrt{2}$  26.  $x = -1$  or  $1/8$  27.  $x^2 - \frac{3}{2}x + \frac{9}{16}$  28. a.  $(1, 1)$

b.  $x = 1$  c. D:  $(-\infty, \infty)$  R:  $[1, \infty)$  d.  $f(x) = 2(x-1)^2 + 1$

29. 200 scooters 30.  $\{2\}$  31. No soln. 32.  $\{1\}$  33.  $\{\frac{28}{3}\}$  34.  $\{-2, 10\}$  35.  $(-1, \infty)$  36.  $(-\frac{17}{3}, 3)$



10.



16.d