Name Answer Key

Pre-Calculus; Review – Chapter 1

Vocabulary: Make sure you are studying your vocabulary – there will be a vocabulary section on the test!

1. Use $(5, -1)$ and $(-5, 5)$ to find an equation of the line that passes through them. Write your answer in point-slope form.

$m = \frac{5+1}{-5-5} = \frac{6}{-10} = \frac{-3}{5}$

$y+1 = \frac{-3}{5}(x-5)$

$y-5 = \frac{-3}{5}(x+5)$

Determine whether the following equations are a function or not. You may use algebra or a graph. How do you know if it is a function or not?

2. $x^2 + y^2 = 4$

CIRCLE WITH RADIUS 2

NOT A FUNCTION

3. $y = 8$

HORIZONTAL LINE

FUNCTION

4. Are the lines $y = 3 - 2x$ and $3x + \frac{3}{2}y - 4 = 0$ parallel, perpendicular or neither?

$m_1 = -2$

$m_2 = -2$

$\frac{3}{2}y = -3x + 4$

$3y = -6x + 8$

$y = -2x + \frac{8}{3}$

PARALLEL

5. Find an equation of a line that passes through $(-1, 0)$ that is parallel and an equation through the same point that is perpendicular to $y = -\frac{1}{2}x + 4$. Write your answers in point-slope form.

PARALLEL

$y - 0 = \frac{-1}{2}(x+1)$

PERPENDICULAR

$y - 0 = 2(x+1)$

Evaluate the function at the given value.

6. $f(x) = 2x - 3$

a. $f(1)$ $= -1$

b. $f(-2)$ $= -7$

c. $f(4)$ $= 5$

d. $f(-\frac{1}{2})$ $= -4$

7. $f(x) = \begin{cases} 2x+1, & x < 0 \\ 2x^2+2, & x \geq 0 \end{cases}$

a. $f(0)$ $= 2$

b. $f(-3)$ $= -5$

c. $f(4)$ $= 34$

d. $f(-1)$ $= -1$

Find the domain and range of the following functions using algebra or a graph. Write your answers in set-builder notation and interval notation.

8. $f(x) = 2x^2 + 3$

D: $\{x \mid x \in \mathbb{R}\}$ $(-\infty, +\infty)$

R: $\{y \mid y \in \mathbb{R}\}$ $(-\infty, +\infty)$

9. $f(x) = \sqrt{x^2 - 4}$

D: $\{x \mid x \leq -2 \text{ or } x \geq 2\}$ $(-\infty, -2] \cup [2, +\infty)$

R: $\{y \mid y \geq 0\}$ $[0, +\infty)$

Prove whether the following functions are even, odd or neither.

10. $f(x) = x^3 - 5$

$f(-x) = (-x)^3 - 5$

$= -x^3 - 5$

NEITHER

11. $f(x) = x^3 + x^2$

$f(-x) = (-x)^3 + (-x)^2$

$= -x^3 + x^2$

$= -[x^3 - x^2]$

NEITHER

Determine where the function is increasing and decreasing – write you answer in interval notation.

12. $f(x) = x^2 - 2$

INCREASING: $(0, +\infty)$

DECREASING: $(-\infty, 0)$

Identify the parent function and describe the transformations that occur. *** Look over the six parent functions ***

13. $g(x) = (-x + 10)^2 + 5$

$P(x) = x^2$

shift $\leftarrow 10$, reflect x-axis, shift $\uparrow 2$

14. $g(x) = -\frac{1}{2}(x - 3)^3$

$P(x) = x^3$

shift $\rightarrow 3$, Vertical Shrink, reflect y-axis

15. $h(x) = 2 - \sqrt{x + 4}$

$P(x) = \sqrt{x}$

Shift $\leftarrow 4$, reflect x-axis, Shift $\uparrow 2$

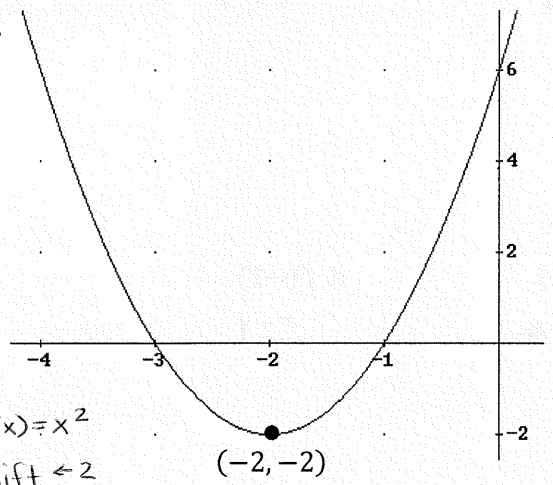
16. $h(x) = |x + 3| - 6$

$P(x) = |x|$

Shift $\leftarrow 3$, $\downarrow 6$

Write an equation for the graphs below.

17.



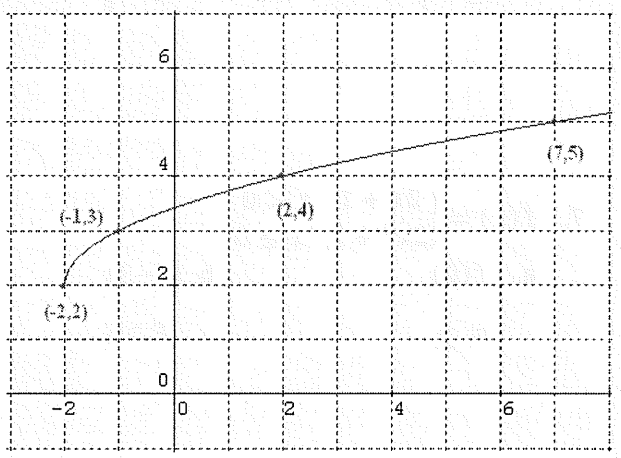
$P(x) = x^2$

Shift $\leftarrow 2$, $\downarrow 2$

$(-2, -2)$

$f(x) = (x+2)^2 - 2$

18.



$P(x) = \sqrt{x}$

Shift $\leftarrow 2$, $\uparrow 2$

$f(x) = \sqrt{x+2} + 2$

19. Let $f(x) = x^2 - 6$ and $g(x) = x + 5$, find:

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

$x^2 - 6 + x + 5 = \boxed{x^2 + x - 1}$

b. $(f - g)(x)$

$x^2 - 6 - x - 5 = \boxed{x^2 - x - 11}$

c. $(fg)(x)$

$(x^2 - 6)(x + 5) = \boxed{x^3 + 5x^2 - 6x - 30}$

d. $\left(\frac{f}{g}\right)(x) = \frac{x^2 - 6}{x + 5}, x \neq -5$

e. Write the domain for $\left(\frac{f}{g}\right)(x)$ in set-builder notation.

$\{x \mid x \neq -5\}$

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

$(2)^2 + (2) - 1 = \boxed{5}$

20. Let $f(x) = x^3$ and $g(x) = \frac{1}{x}$. Find $f \circ g$ and $g \circ f$. What is the domain of each (in interval notation)?

$f(g(x)) = \frac{1}{x^3}$ D: $(-\infty, 0) \cup (0, +\infty)$

$g(f(x)) = \frac{1}{x^3}$ D: $(-\infty, 0) \cup (0, +\infty)$

21. Let $f(x) = \sqrt{x - 6}$ and $g(x) = x^2 + 5$. Find $f \circ g$ and $g \circ f$. What is the domain of each (in interval notation)?

$f(g(x)) = \sqrt{x^2 + 5 - 6} = \sqrt{x^2 - 1}$

D: $(-\infty, -1] \cup [1, +\infty)$

$g(f(x)) = (\sqrt{x - 6})^2 + 5$

$= x - 6 + 5$

$= x - 1$

D: $[6, +\infty)$

Find the inverse function for the following:

22. $f(x) = 8x + 1$

$x = 8y + 1$

$8y = x - 1$

$y = \frac{x - 1}{8}$

$\boxed{f^{-1}(x) = \frac{x - 1}{8}}$

23. $h(x) = \sqrt{x - 5}$

$x = \sqrt{y - 5}$

$x^2 = y - 5$

$y = x^2 + 5$

$\boxed{h^{-1}(x) = x^2 + 5}$

24. $g(x) = \frac{7}{x - 2}$

$x = \frac{7}{y - 2}$

$y - 2 = \frac{7}{x}$

$y = \frac{7}{x} + 2$

$\boxed{g^{-1}(x) = \frac{7}{x} + 2}$

Show that $f(x)$and $g(x)$ are inverse functions algebraically.

25. $f(x) = \frac{x^3}{2}$, $g(x) = \sqrt[3]{2x}$

$f(g(x)) = \frac{(\sqrt[3]{2x})^3}{2} = x$ ✓

$g(f(x)) = \sqrt[3]{2\left(\frac{x^3}{2}\right)} = x$ ✓

Given the following sets of points, find the inverse.

26. $f(x) = \{(-3,-250), (-2,39), (-1,-8), (0,-7), (1,-6)\}$

$f^{-1}(x) = \{(-250,-3), (39,-2), (-8,-1), (-7,0), (-6,1)\}$