

Key

Pre-Calculus Semester Review Chapter 1

1. Find the vertex of $f(x) = 25 - 4x - x^2$

$$= -(x^2 + 4x + 4) + 25 + 4$$

$$= -(x+2)^2 + 29$$

$$V: (-2, 29)$$

2. Write the quadratic equation for a graph of a parabola whose vertex is at (2,-3) and has a point on the graph at (0,2).

$$y = a(x-2)^2 - 3$$

$$2 = a(0-2)^2 - 3$$

$$2 = 4a - 3$$

$$5 = 4a$$

$$a = \frac{5}{4}$$

$$y = \frac{5}{4}(x-2)^2 - 3$$

3. Find x so the distance from origin to (x,9) is 15.

$$15 = \sqrt{(x-0)^2 + (9-0)^2}$$

$$225 = x^2 + 81 \quad x^2 = 144 \quad x = \pm 12$$

4. Find the center and radius of the circle: $(x-2)^2 + y^2 = 15$

$$C: (2, 0)$$

$$r = \sqrt{15}$$

5. Is $f(x) = 3x^4 - x^2 + 2$ even, odd, or neither? $f(-x) = 3x^4 - x^2 + 2$ even

6. Identify the symmetry in $y = x^3 + 3x$. $f(-x) = -x^3 - 3x$ odd

- a) x-axis b) y-axis c) origin d) both a and b e) none

7. What is the domain of $f(x) = \sqrt{1-x^2}$? Write in interval notation.

$$1-x^2 = 0$$

$$x^2 = 1$$

$$x = \pm 1 \text{ BOUNDARY PTS}$$



$$[-1, 1]$$

8. What is the domain of $f(x) = \frac{3}{x^2 - 3x - 4}$? Write in interval notation.

$$(x-4)(x+1)$$

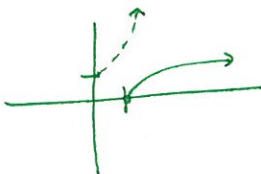
$$x = 4, -1 \text{ BOUNDARY PTS}$$

$$x \neq 4, -1$$

OR

$$(-\infty, -1) \cup (-1, 4) \cup (4, \infty)$$

9. If $f(x) = \sqrt{x-1}$, find $f^{-1}(x)$. What is domain of $f^{-1}(x)$?



$$y = \sqrt{x-1}$$

$$x = \sqrt{y-1}$$

$$x^2 = y-1$$

$$x^2 + 1 = y$$

$$f^{-1}(x) = x^2 + 1, \quad x \geq 0$$

10. Find inverse of $f(x) = \frac{7}{x+2}$

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

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

$$f^{-1}(x) = \frac{7}{x} - 2$$

11. Given $f(x) = 7x+2$ and $g(x) = x^2 - 9$, find the product $(fg)(x)$.

$$(fg)(x) = (7x+2)(x^2-9)$$

$$= 7x^3 - 63x + 2x^2 - 18$$

$$7x^3 + 2x^2 - 63x - 18$$

12. Given $f(x) = 5x+1$, find $f(x-1) - f(2)$.

$$f(x-1) - f(2) = 5(x-1) + 1 - (5 \cdot 2 + 1)$$

$$= 5x - 5 + 1 - 11$$

$$= \underline{5x - 15}$$

13. Given $f(x) = 4-x$, find $f(x+2) + f(x-1)$.

$$f(x+2) + f(x-1) = 4 - (x+2) + 4 - (x-1)$$

$$= 4 - x - 2 + 4 - x + 1$$

$$= \underline{7 - 2x}$$

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

$$g(f(x)) = \frac{x-2+5}{3}$$

$$= \underline{\frac{x+3}{3}}$$

15. Given $f(x) = 2x^2 - x + 3$, simplify $\frac{f(x+h) - f(x)}{h}, h \neq 0$

$$\frac{2(x+h)^2 - (x+h) + 3 - (2x^2 - x + 3)}{h}$$

$$\frac{2x^2 + 4xh + 2h^2 - x - h + 3 - 2x^2 + x - 3}{h}$$

$$\frac{4xh + 2h^2 - h}{h}$$

$$\frac{h(4x + 2h - 1)}{h}$$

$$4x + 2h - 1$$