

Solutions: Practice Test 2

1. midpoint = $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = \left(\frac{5+5}{2}, \frac{3+(-9)}{2}\right) = (5, -3)$

2. $d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2} = \sqrt{(6-8)^2 + (-9-1)^2} = \sqrt{(-14)^2 + (-10)^2} = \sqrt{296} = \sqrt{4 \cdot 74} = 2\sqrt{74}$

3. $(x-2)^2 + (y+5)^2 = 64$

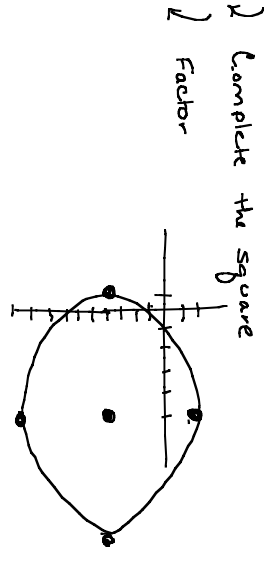
4. $x^2 + y^2 - 10x + 8y + 5 = 0$
 Group x terms + y terms together.
 Bring 5 to other side.

$x^2 - 10x + y^2 + 8y = -5$

$x^2 - 10x + 25 + y^2 + 8y + 16 = -5 + 25 + 16$

$(x-5)^2 + (y+4)^2 = 36$

Center: (5, -4) radius: 6



5. $\left(\frac{f}{g}\right)(x) = \frac{-8x^2 - 2x}{5-x}$

domain = $(-\infty, 5) \cup (5, \infty)$

6. $(f-g)(x) = f(x) - g(x) = x^2 - x - 12 - (-3x - 3) = x^2 - x - 12 + 3x + 3 = x^2 + 2x - 9$

$(f-g)(8) = 8^2 + 2(8) - 9 = 64 + 16 - 9 = 71$

7. $(fg)(x) = \underbrace{(x^2 + 6x + 5)}_{(-2x-4)} = -2x^3 - 4x^2 - 12x^2 - 24x - 10x - 20 = -2x^3 - 16x^2 - 34x - 20$

$(fg)(1) = -2(1)^3 - 16(1)^2 - 34(1) - 20 = -2 - 16 - 34 - 20 = -72$

8. $\left(\frac{f}{g}\right)(x) = \frac{x^2 + x - 12}{-15x + 8}$

$\left(\frac{f}{g}\right)(3) = \frac{3^2 + 4(3) - 12}{-15(3) + 8} = \frac{9 + 12 - 12}{-45 + 8} = \frac{9}{-37}$

9. $(f \circ g)(x) = f(g(x)) = f(x^4 + 1) = \sqrt[4]{x^4 + 1 - 1} = \sqrt[4]{x^4} = x$

$(f \circ g)(0) = 0$

10. $(f \circ g)(x) = f(g(x)) = f\left(\frac{x+1}{5}\right) = 5\left(\frac{x+1}{5}\right) - 1 = x + 1 - 1 = x$

$(g \circ f)(x) = g(f(x)) = g(5x - 1) = \frac{5x - 1 + 1}{5} = \frac{5x}{5} = x$

$$11. (f \circ g)(x) = f(g(x)) = f(-3x-9) = \sqrt{-3x-9+6} = \sqrt{-3x-3}$$

$$(g \circ f)(x) = g(f(x)) = g(\sqrt{x+6}) = -3\sqrt{x+6} - 9$$

$$12. g \circ f = g(f(x)) = g(x+8) = (x+8)^2 = (x+8)(x+8) = x^2 + 8x + 64 = x^2 + 16x + 64$$

$$13. \text{Difference quotient} = \frac{f(x+h) - f(x)}{h}$$

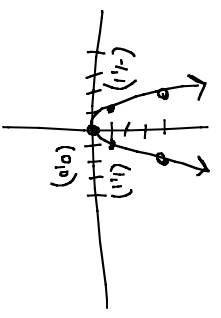
$$f(x+h) = -5(x+h)^2 - 7 = -5(x^2 + 2xh + h^2) - 7 = -5x^2 - 10xh - 5h^2 - 7$$

$$\text{Difference quotient} = \frac{-5x^2 - 10xh - 5h^2 - 7 - (-5x^2 - 7)}{h} = \frac{-10xh - 5h^2}{h} = -10x - 5h$$

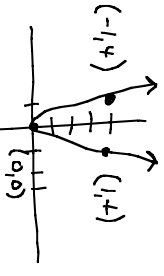
$$14. f(x+h) = -2(x+h) - 4 = -2x - 2h - 4$$

$$\text{Difference quotient} = \frac{-2x - 2h - 4 - (-2x - 4)}{h} = \frac{-2x - 2h - 4 + 2x + 4}{h} = -2$$

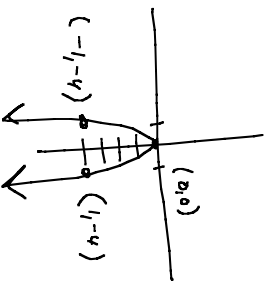
15.



$$f(t) = t^2$$

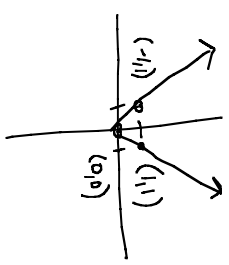


$f(t) = 4t^2$
Vertical stretch

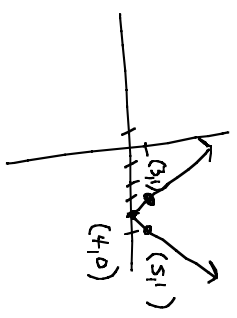


$f(t) = -4t^2$
Vertical reflection

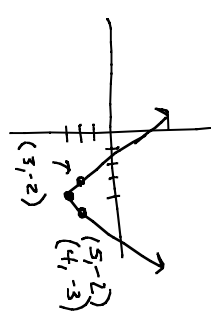
16.



$$f(x) = |x|$$



$f(x) = |x-4|$
horizontal shift 2 units



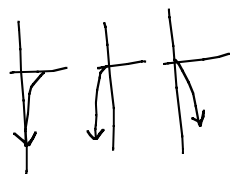
$f(x) = |x-4|-3$
vertical shift 3 units down

17. $f(x) = (x-2)^2 - 1$

18. $g(x) = \sqrt{x}$ basic function

$g(x) = -\sqrt{x}$ reflection across the x-axis

$g(x) = -\sqrt{x} + 3$ vertical shift up 3 units



19. $f(x) = |x-2| - 2$ or something similar

20. $(0, 2)$

21. even

22. $f(0) = 2(0)^3 + 0^2 + 1 = 1$

$f(-3) = 2(-3)^3 + (-3)^2 + 1 = -44$

avg. rate of change = $\frac{f(-3) - f(0)}{-3 - 0} = \frac{-44 - 1}{-3} = \frac{-45}{-3} = 15$

23. $|2x+5| = 8$

$2x+5 = -8$ or $2x+5 = 8$

$2x = -13$ $2x = 3$

$x = -13/2$ or $x = 3/2$

24. $|1 + |-4x+9|| = 5$

$|-4x+9| = 4$

$-4x+9 = 4$ $-4x+9 = -4$

$-4x = -5$ $-4x = -13$

$x = 5/4$

$x = 13/4$

25. $|4-5x| \leq 11$

$-11 \leq 4-5x \leq 11$

$-4 \leq -5x \leq 4$

$$-\sqrt{5} \leq -5x \leq 7$$

$$-\sqrt{5} \quad -5 \quad -\sqrt{5}$$

$$3 \geq x \geq -7/5$$

$$[-7/5, 3]$$

26. $|2x-2| \geq 6$

$$2x-2 \geq 6 \quad \text{or} \quad 2x-2 \leq -6$$

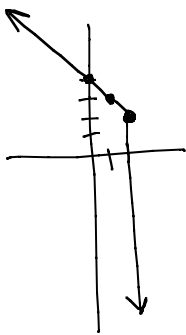
$$\frac{+2}{+2} \quad +2 \quad +2$$

$$2x \geq 8 \quad \text{or} \quad 2x \leq -4$$

$$x \geq 4 \quad \text{or} \quad x \leq -2$$

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

27. $f(x) = \begin{cases} x+4 & x < -2 \\ 2 & x \geq -2 \end{cases}$



28. $f(x) = \begin{cases} \sqrt{x} & 0 \leq x < 4 \\ -x+5 & 5 < x < 6 \\ x-7 & 6 < x \leq 10 \end{cases}$

