Chapter 3 review (3.1, 3.2) **Name**_____

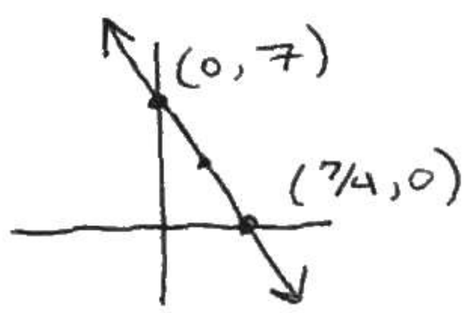
In Problems 1 – 3:
(a) Determine the slope and y-intercept of each linear function.
(b) Find the average rate of change of each function.
(c) Graph each function. Label the intercepts.
(d) Determine whether the function is increasing, decreasing, or constant.

1. $F(x) = -4x + 7$

a) $m = -4$ $b = 7$

b) Down 4 over 1

c)



d) Decreasing

2. $h(x) = \frac{4}{5}x - 6$

a) $\frac{4}{5}, -6$

b) $\frac{4}{5}$

c)

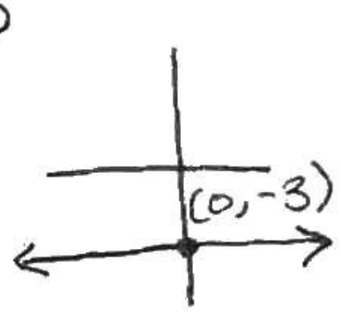
d) Increasing

3. $H(x) = -3$

a) 0, -3

b) 0

c)



d) constant

In Problems 4 and 5, determine whether the function is linear or nonlinear. If the function is linear, find the equation of the line.

4.

x	$y = f(x)$
-1	$\frac{17}{2}$
0	7
1	$\frac{11}{2}$
2	4
3	$\frac{5}{2}$

linear

$y = -\frac{3}{2}x + 7$

5.

x	$y = f(x)$	
-1	4	4
0	8	3
1	11	2
2	13	1
3	14	

nonlinear

In Problems 6-8, graph each quadratic function using transformations (shifting, compressing, stretching, and/or reflecting). Put into vertex form first!

6

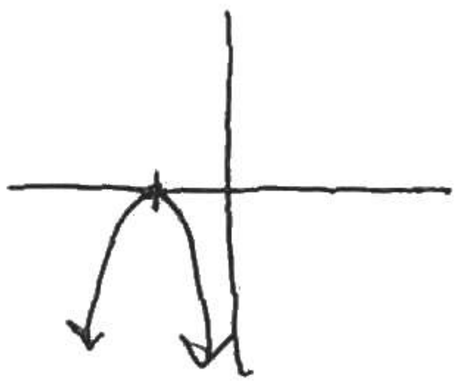
6. $f(x) = x^2 + 2x - 3$

$x^2 + 2x + 1 = 3 + 1$

$(x+1)^2 = 4$

$y = (x+1)^2 - 4$

7. $f(x) = -2(x + 1)^2$



8. $f(x) = -2x^2 + 6x + 2$

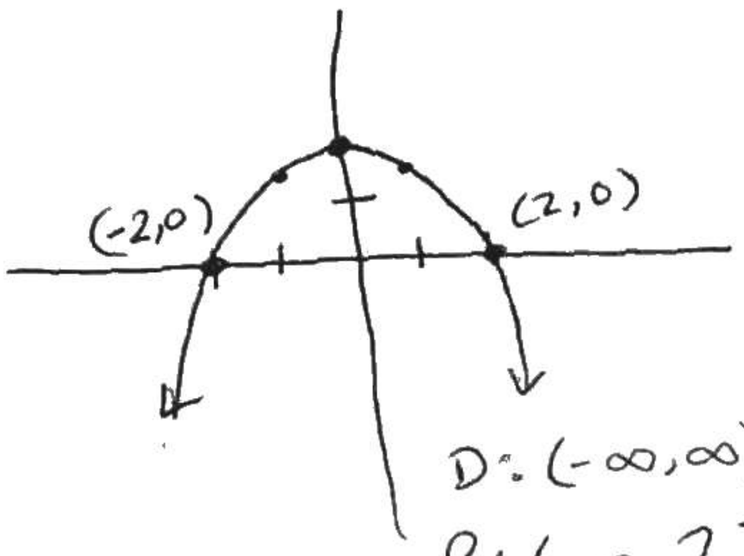
$-\frac{18}{4} - 2 = -2\left(x^2 - 3x + \frac{9}{4}\right)$

$-\frac{26}{4} = -2\left(x - \frac{3}{2}\right)^2 + \frac{26}{4}$

$y = -2\left(x - \frac{3}{2}\right)^2 + \frac{26}{4}$

In Problems 9 -12 , (a) graph each quadratic function by determining whether the graph opens up or down and by finding its vertex, axis of symmetry, y-intercept, and x-intercepts, if any. (b) Determine the domain and the range of the function. (c) Determine where the function is increasing, and where it is decreasing.

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



D: $(-\infty, \infty)$

R: $(-\infty, 2]$

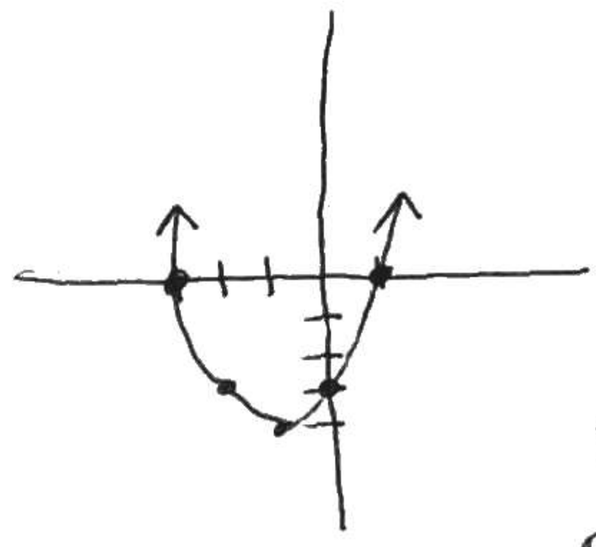
Increasing $(-\infty, 0)$

Decreasing $(0, \infty)$

10. $F(x) = x^2 + 2x - 3$

$\frac{-2}{2(1)} = -1$

$(-1, -4)$



D: $(-\infty, \infty)$

R: $[-4, \infty)$

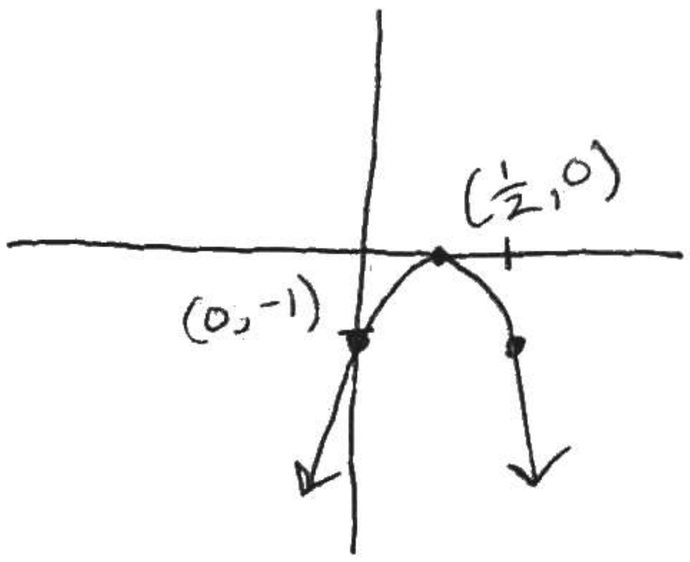
Increasing $(-1, \infty)$

Decreasing $(-\infty, -1)$

11. $f(x) = -4x^2 + 4x - 1$

$\frac{-4}{2(-4)} =$

$(\frac{1}{2}, 0)$



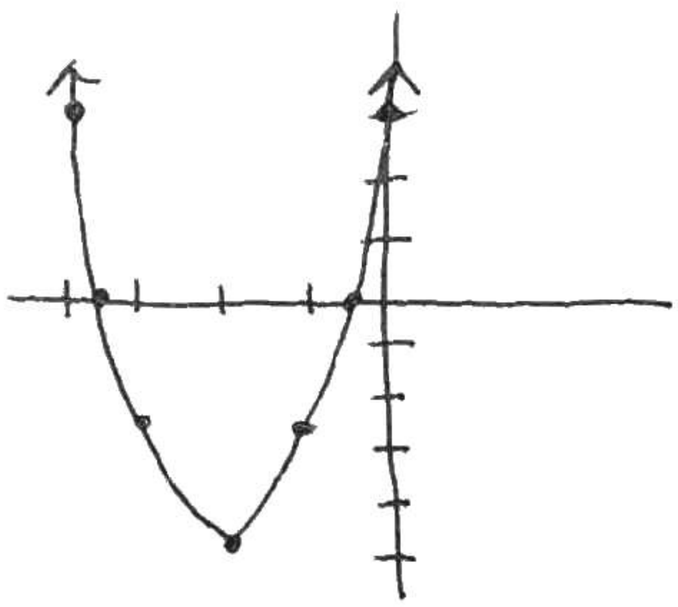
D: $(-\infty, \infty)$

R: $(-\infty, 0]$

Increasing $(-\infty, \frac{1}{2})$

Decreasing $(\frac{1}{2}, \infty)$

12. $F(x) = 2x^2 + 8x + 3$



D: $(-\infty, \infty)$

R: $[-5, \infty)$

$\frac{-8}{2(2)} = -2$

$(-2, -5)$

$\frac{-8 \pm \sqrt{64 - 4(2)(3)}}{4}$

$\frac{-8 \pm \sqrt{40}}{4}$

$\frac{-8 \pm \sqrt{4}\sqrt{10}}{4}$

$\left(\frac{-4 \pm \sqrt{10}}{2}, 0\right)$

Increasing $(-2, \infty)$

Decreasing $(-\infty, -2)$

In Problems 13 – 15, determine whether the given quadratic function has a maximum or a minimum value, and then find the value.

13. $f(x) = 2x^2 + 8x + 5$

$\frac{-8}{2(2)}$ min

$(-2, -3)$

14. $F(x) = -x^2 - 10x - 3$

$\frac{10}{2(-1)}$ Max

$(-5, 22)$

15. $f(x) = -3x^2 + 12x + 4$

Max

$-\frac{12}{2(-3)} = 2$

$(2, 16)$

In Problems 16and 17, find the quadratic function for which:

16. Vertex is (3, -2); contains the point (1, 6)

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

$6 = a(1-3)^2 - 2$

$6 = 4a - 2$

$8 = 4a$

$a = 2$

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

17. Contains the points (-6, 1), (-4, 5), and (-2, 1)

$y = a(x+4)^2 + 5$

$1 = a(-2+4)^2 + 5$

$1 = 4a + 5$

$-4 = 4a$

$a = -1$

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

18. Bill was just offered a sales position for a computer company. His salary would be $25,000 per year plus 1% of his total annual sales.

(a) Find a linear function that relates Bill's annual salary, S, to his total annual sales, x.

$S(x) = 25000 + .01x$

(b) In 2012, Bill had total annual sales of $1,300,000. What was Bill's salary?

$5(1300000) = 25000 + .01(1300000)$

13000

38,000

(c) What would Bill have to sell to earn $100,000?

$100000 = 25000 + .01x$

$7,500,000$

(d) Determine the sales required of Bill for his salary to exceed $150,000.

$150\,000 \leq 25000 + .01x$

$12,500,000 \leq x$

Solve the following radical equations.

19. $\sqrt{x^2+8} = 2\sqrt{2x-1}$

$x^2+8 = 4(2x-1)$

$x^2+8 = 8x-4$

$x^2-8x+12 = 0$

$(x-6)(x-2) = 0$

$\{6, 2\}$

20. $\sqrt{x} - 4 = \sqrt{9x}$

$x - 8\sqrt{x} + 16 = 9x$

$(-8\sqrt{x})^2 = (8x-16)^2$

$64x = 64x^2 - 256x + 256$

$0 = 64x^2 - 320x + 256$

$\{4, 1\}$ $0 = 64(x^2-5x+4)$

$0 = 64(x-4)(x-1)$