



Math 1200 Exam 3A Spring 2018-2019 Name

Each of the 20 questions is worth five points. To get full/partial credit show all your work.

1. Given  $h(x) = x^2 + 3x + 5$ , evaluate  $h(-3)$  Exam B Q13

$$h(-3) = (-3)^2 + 3(-3) + 5$$

$$= 9 - 9 + 5$$

$$= \boxed{5}$$

2. Write the domain of the given function  $f(x) = \frac{x-5}{x^2-10x+25}$  in an interval notation. Exam B Q14

$$x^2 - 10x + 25 = 0$$

$$(x-5)^2 = 0$$

$$x = 5$$

$$\text{Domain} = (-\infty, 5) \cup (5, \infty)$$

3. Find the x- and y-intercepts of the function defined by  $f(x) = x^2 - 4$ . Exam B Q15

x intercepts:  $0 = x^2 - 4$   
 $x^2 = 4$   
 $x = \pm 2$   
 $(2, 0), (-2, 0)$

y intercept:  $y = 0^2 - 4$   
 $y = -4$   
 $(0, -4)$

4. Write the equation of the line passing through the points  $(-3, 2)$  and  $(6, -7)$  in standard form Exam B Q16

$$m = \frac{2 - (-7)}{-3 - 6} = \frac{9}{-9} = -1$$

$$y = mx + b$$

$$-3 = -1(-2) + b$$

$$-3 = -2 + b$$

$$b = -1$$

$$y = -x - 1 \text{ OR } 1 = -x - y$$

5. Given the line  $8x + 4y = 4$ , find Exam B Q17

a. The slope  
 $8x + 4y = 4$   
 $4y = 4 - 8x$   
 $y = -2x + 1$   
 slope =  $-2$

b. The y-intercept  
 $x = 0$   
 $8(0) + 4y = 4$   
 $4y = 4$   
 $y = 1$   
 $(0, 1)$

6. Given the function defined by  $f(x) = x^2 - 1$ , determine the average rate of change from  $x_1 = -2$  to  $x_2 = 0$  Exam B Q18

$$f(-2) = (-2)^2 - 1 = 4 - 1 = 3$$

$$f(0) = (0)^2 - 1 = -1$$

$$\text{average rate of change} = \frac{f(0) - f(-2)}{0 - (-2)} = \frac{-1 - 3}{0 + 2} = \frac{-4}{2} = -2$$

7. Write an equation of the line passing through the point  $(-4, 1)$  and parallel to the line  $4x + 4y = 8$ . Write the answer in slope-intercept form Exam B Q19

$$4x + 4y = 8$$

$$4y = 8 - 4x$$

$$y = -x + 2$$

$$m = -1$$

$$y = mx + b$$

$$1 = -1(-4) + b$$

$$1 = 4 + b$$

$$b = -3$$

$$y = -x - 3$$

8. A speeding ticket is \$100 plus \$5 for each mph over the speed limit. Write a linear function to model the cost  $C(x)$  of a speeding ticket for a person caught driving  $x$  mph over the speed limit. Exam B Q20

$$C(x) = 100 + 5x$$

9. Using the linear equations for cost and revenue given by: Exam B Q1

$$C(x) = 25x + 100; \quad R(x) = 30x$$

a) Write a linear equation to determine Profit  $P(x)$ .

$$P(x) = R(x) - C(x)$$

$$= 30x - (25x + 100)$$

$$= 30x - 25x - 100$$

$$= 5x - 100$$

b) Determine the profit in dollars when 20 units are sold and interpret your results.

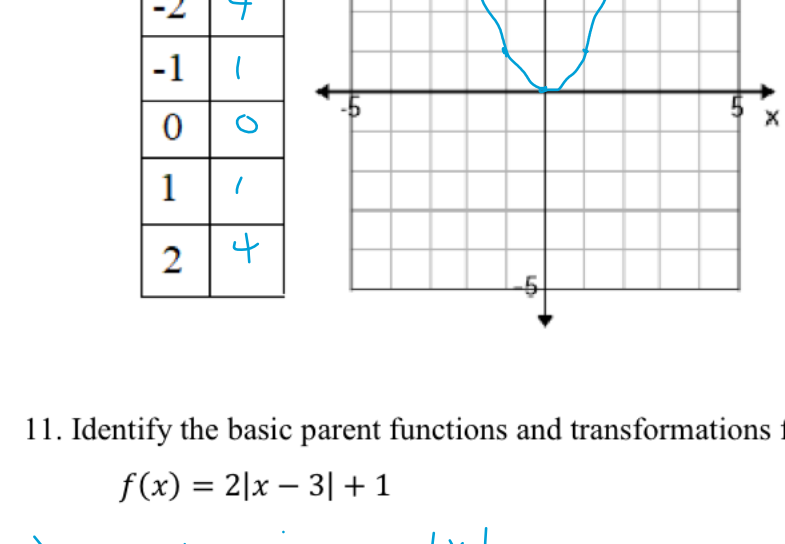
$$P(x) = 5x - 100$$

$$P(20) = 5(20) - 100$$

$$= 100 - 100$$

$$= 0$$

20 is the break even number of units



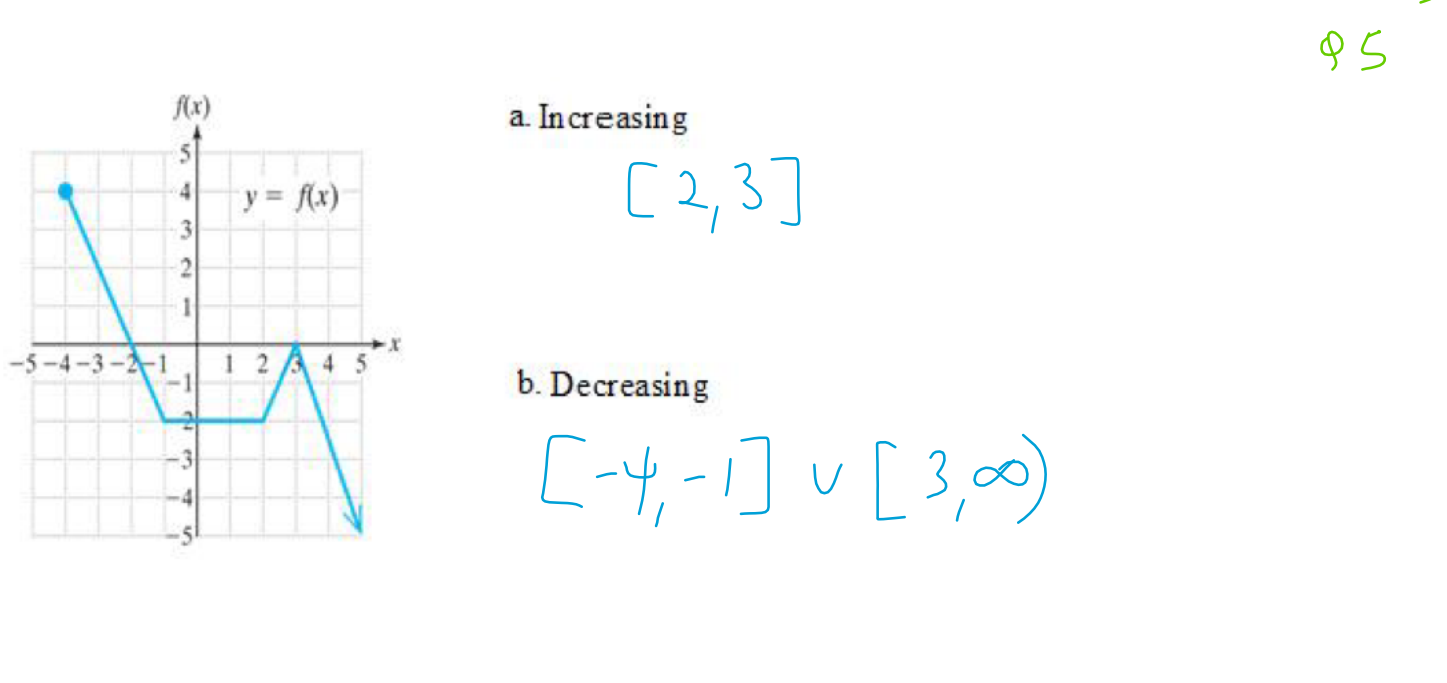
11. Identify the basic parent functions and transformations for the given function  $f(x) = 2|x - 3| + 1$  Exam B Q3

parent function =  $|x|$   
 transformations = Shift to the right by 3 units  
 Vertical stretch by 2 units  
 Shift upward by 1 unit

12. Using definition determine if the function  $g(x) = 4x^3 - x$  is even, odd, or neither Exam B Q4

Even: substitute  $-x$  for  $x$   
 $g(-x) = 4(-x)^3 - (-x)$   
 $= -4x^3 + x$   
 not original function so not even

odd: from results of even we can see that  $g(-x) = -g(x)$   
 hence function is odd



14. Given the piecewise function Exam B Q6

$$f(x) = \begin{cases} x + 3 & \text{for } x < -1 \\ x^2 & \text{for } -1 \leq x < 2 \end{cases}$$

Evaluate,

a.  $f(-1)$   
 $f(-1) = (-1)^2 = 1$

b.  $f(-2)$   
 $f(-2) = (-2) + 3 = 1$

15. Given  $g(x) = 2x$  and  $h(x) = x^2 - 4x$ , find Exam B Q7

a.  $(g-h)(x)$   
 $(g-h)(x) = g(x) - h(x)$   
 $= 2x - (x^2 - 4x)$   
 $= 2x - x^2 + 4x$   
 $= -x^2 + 6x$

b. the domain of  $(g-h)(x)$  in interval notation  
 $\text{domain} = (-\infty, \infty)$

16. Given  $f(x) = x^2 + 3$  and  $g(x) = 3x + 2$ , evaluate  $(g \circ f)(x)$  Exam B Q8

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

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

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

$$= 3x^2 + 9 + 2$$

$$= 3x^2 + 11$$

17. Given  $f(x) = 4x - 2$ , find Exam B Q9

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

b. the difference quotient  $\frac{f(x+h) - f(x)}{h}$   
 $\frac{f(x+h) - f(x)}{h} = \frac{(4x+4h-2) - (4x-2)}{h}$   
 $= \frac{4x+4h-2-4x+2}{h}$   
 $= \frac{4h}{h}$   
 $= 4$

18. Given  $f(x) = -2(x-1)^2 + 8$ , determine Exam B Q10

a. The vertex  
 $\text{vertex} = (1, 8)$

b. The minimum or maximum value of  $f(x)$   
 $\text{maximum value of } 8$

19. Write  $f(x) = 3x^2 + 12x + 5$  in vertex form. Exam B Q11

$$3x^2 + 12x + 5 = 3(x^2 + 4x) + 5$$

$$= 3(x^2 + 4x + 4 - 4) + 5$$

$$= 3[(x+2)^2 - 4] + 5$$

$$= 3(x+2)^2 - 12 + 5$$

$$= 3(x+2)^2 - 7$$

20. Given  $f(x) = -x^2 + 4x - 5$ , determine Exam B Q12

a. The axis of symmetry  
 $h = \frac{-b}{2a}$   
 $a = -1 \quad b = 4 \quad c = -5$   
 $h = \frac{-4}{2(-1)} = \frac{-4}{-2} = 2$   
 axis of symmetry =  $\text{line } x = 2$

b. The range in interval notation  
 $k = f(h)$   
 $k = -(2)^2 + 4(2) - 5$   
 $= -4 + 8 - 5$   
 $= -1$   
 Range =  $(-\infty, -1]$