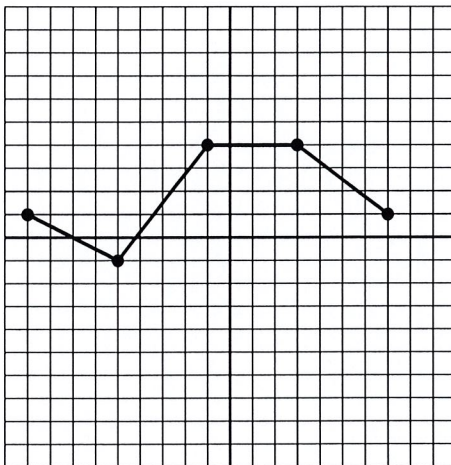


There are 16 problems on this exam. Carefully read and follow all directions. In order to receive credit show all necessary work. No credit will be given for an answer I cannot find or cannot read. All answers should be exact unless specified otherwise.

1. Use the graph of the function F shown below to determine the following. (4 points each)



- (a) Domain of F

$$[-9, 7]$$

- (b) Range of F

$$[-1, 4]$$

- (c) $F(-9)$

$$= 1$$

- (d) y -intercept

$$(0, 4)$$

- (e) x -intercept(s)

$$(-7, 0) \left(-\frac{21}{5}, 0\right)$$

- (f) The intervals for x where F is increasing

$$(-5, -1)$$

- (g) The intervals for x where F is decreasing

$$(-9, -5) \cup (3, 7)$$

- (h) The intervals for x where F is constant

$$(-1, 3)$$

- (i) Classify the point $(-1, 4)$ as an extreme point. If the point is not an extreme point write NONE.

local and absolute max

Use the three functions given below to determine the specified information in problems 2-11. (4 points each)

$$a(x) = \frac{3}{x^2 - 64}$$

$$b(x) = \sqrt{x + 10} + 3$$

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

2. Domain of $a(x)$

$$x \neq -8, 8$$

3. Domain of $b(x)$

$$x \geq -10$$

4. Domain of $c(x)$

$$(-\infty, \infty)$$

5. Range of $b(x)$

$$y \geq 3$$

6. Range of $c(x)$

$$(-\infty, 2]$$

7. $(b + c)(54)$

$$\begin{aligned} &= b(54) + c(54) \\ &= 11 + (-2702) \\ &= -2691 \end{aligned}$$

8. $(b - c)(54)$

$$\begin{aligned} &= 11 - (-2702) \\ &= 2713 \end{aligned}$$

9. $(bc)(54)$

$$\begin{aligned} &= 11 \cdot -2702 \\ &= -29722 \end{aligned}$$

10. $\left(\frac{b}{c}\right)(54)$

$$= \frac{11}{-2702}$$

11. $b(x + 2)$

$$\begin{aligned} &= \sqrt{x + 2 + 10} + 3 \\ &= \sqrt{x + 12} + 3 \end{aligned}$$

Determine whether or not each of the following relations is a function. Circle YES if the relation is a function and circle NO if the relation is not a function. (2 points each)

12. YES NO

$$x^2 + y = 4$$

13. YES NO

$$\{(-4, -1), (-2, 2), (-7, -1), (-5, 0)\}$$

14. YES NO

$$\{(0, 3), (2, -4), (-3, 4), (0, -5)\}$$

15. YES NO

$$x + y = 4$$

16. Use the function $G(x) = x^2 + 4x - 21$ to determine the following. (4 points each)

(a) Domain of G

$$(-\infty, \infty)$$

(b) Range of G

$$[-25, \infty)$$

(c) $G(-1)$

$$= -24$$

(d) x -intercept(s)

$$(-7, 0) \quad (3, 0)$$

(e) Determine the difference quotient, $\frac{G(x+h)-G(x)}{h}$, for the function G defined above. Simplify your answer.

$$\begin{aligned} & \frac{(x+h)^2 + 4(x+h) - 21 - (x^2 + 4x - 21)}{h} \\ &= \frac{x^2 + 2xh + h^2 + 4x + 4h - 21 - x^2 - 4x + 21}{h} \\ &= 2x + h + 4 \end{aligned}$$