

Clearly indicate your answers. Unless otherwise indicated, all parts of all problems are four points each.

1. For  $f(x) = \sqrt{x - 6}$  and  $g(x) = 3x + 2$
- a. Determine the domain of  $h(x) = f \cdot g(x)$
  
  
  - b. Evaluate  $h(2)$  if possible.

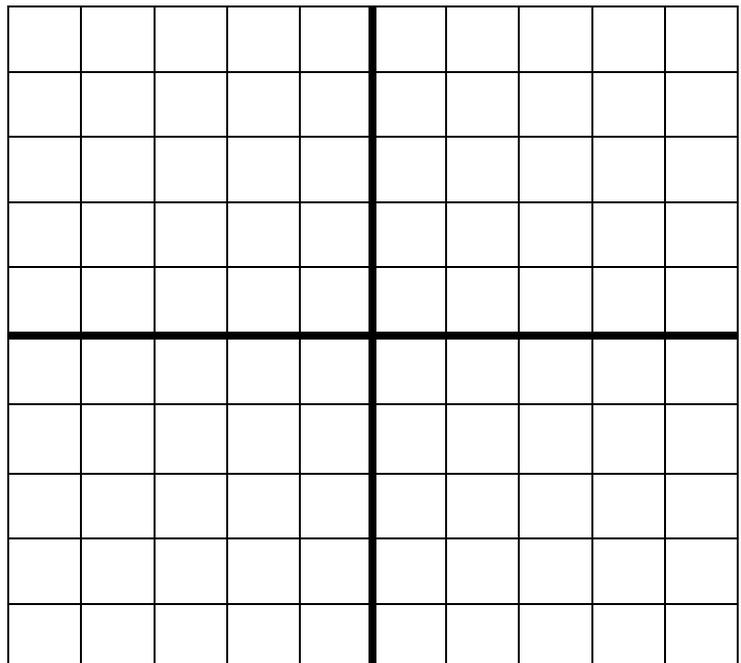
2. For  $f(x) = x^2 + 2x$  and  $g(x) = x - 3$
- a. Determine  $h(x) = (f \circ g)(x)$
  
  
  - b. Determine the domain of  $h(x)$

- c. Evaluate  $h(2)$ .

3. Use the given graphs on the right to find the result of the operations indicated.

a.  $(f - g)(1)$

b.  $\left(\frac{f}{g}\right)(0)$



4. Use the quadratic equation to find the  $x$ -intercepts of  $g(x) = x^2 - 6x + 3$

5. The profit from producing  $x$  toys is given by  $P(x) = -x^2 + 100x - 200$ .

a. How many units should be sold to maximize the profit?

b. What is the maximum profit?

6. Divide the following and write the answer as dividend = (divisor)(quotient) + remainder.

$$\frac{x^3 - 3x^2 - 4x - 20}{x - 1}$$

7. Use synthetic division and the factor theorem to determine if  $x - 3$  is a factor of  $x^3 - 3x^2 - 5x + 15$ .

8. Use the given zero  $x = -2$  to write  $x^3 - 5x^2 - 2x + 24$  in completely factored form. (6 points)

9. List all possible rational zeros of  $4x^3 - 2x + 15$  (but do not solve). (6 points)

10. Find the zeros of the following polynomial. (8 points)

$$x^5 + 2x^2 - 9x + 6$$

11. Let  $f(x) = (x - 2)(x + 3)^2(x - 1)^2$  Find all of the zeros of  $f(x)$ .

12. Let  $f(x) = 3x^4 + 2x^3 - 8x^2$

(8 points)

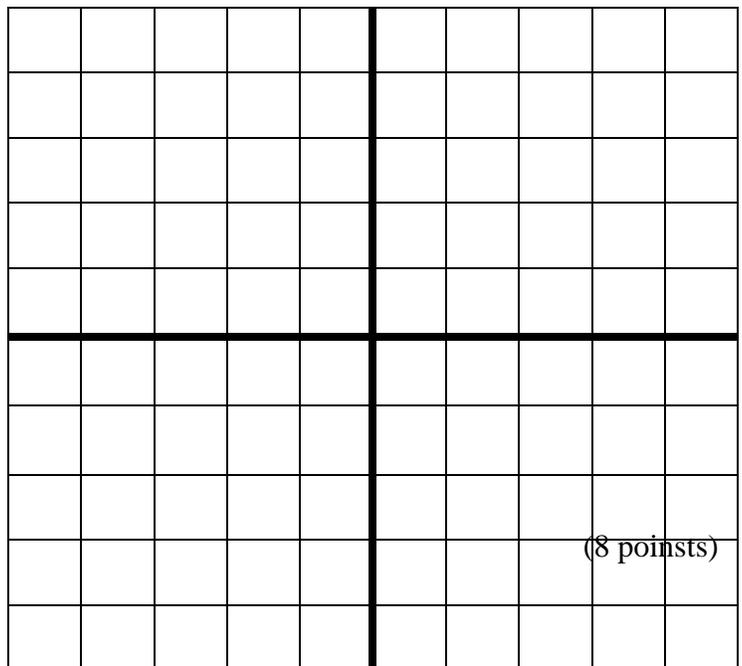
Find all of the zeros of  $f(x)$  and write it in completely factored form.

13. Let  $y = -2x^2 + 8x - 6$

a. Find the vertex of  $f(x)$

b. Find the intercepts

c. Graph the function and label the intercepts and vertex. (8 points)



(8 points)