

*Show all work! Circle all answers.*

{25 pts.} 1. (a) Find the equation on the line that is parallel to  $x + 2y = 7$  and that passes through the point  $(11, -7)$ . Write your answer in point-slope form.

(b) Find a linear function  $f$  satisfying  $f(2) = 9$  and whose  $x$ -intercept is 4.

(c) Write the equation of the vertical line that passes through the point  $(-2, 5)$ . What is the slope of this line?.

(d) What is the equation of the  $x$ -axis, that is, the horizontal line through the origin. What is the slope of this line?

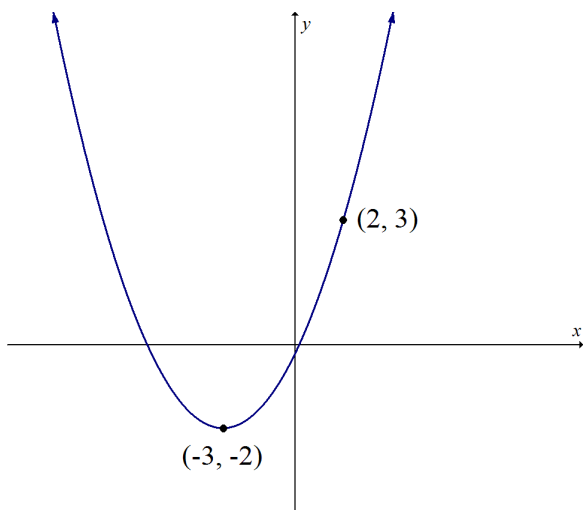
{15 pts.} 2. Let  $f(x) = -x^2 + 6x - 3$ .

(a) Rewrite this quadratic function in standard form by completing the square.

(b) What is the vertex of the graph of  $f$ ?

(c) Find all intercepts of the graph of  $f$ .

{10 pts.} 3. Find the equation of the parabola whose graph is below.



{10 pts.} 4. If  $f(x) = \frac{x}{x+2} - 3$ , find  $f^{-1}(4)$ .

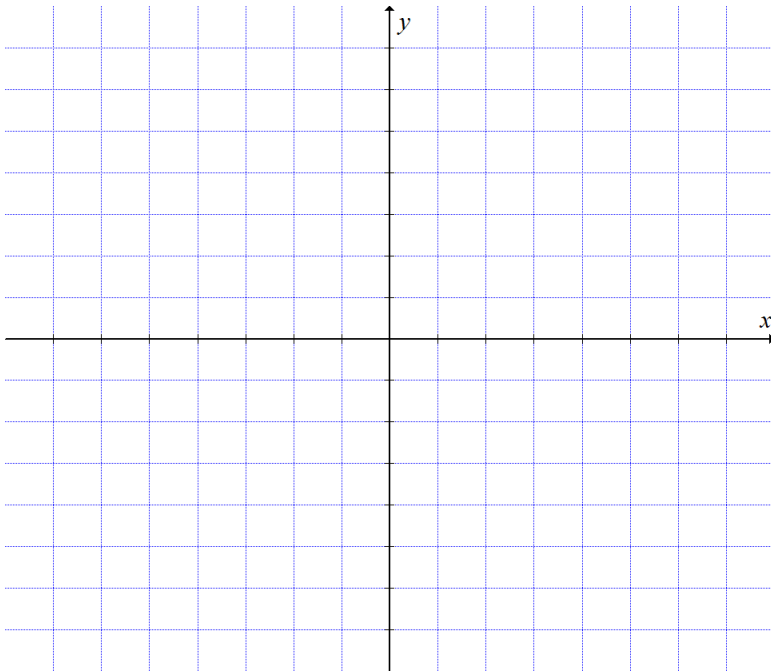
{10 pts.} 5. Find the inverse function of  $f(x) = \frac{3x+1}{7}$ .

{5 pts.} 6. Find two functions  $f$  and  $g$  such that  $(f \circ g)(x) = \frac{1}{(x^2 - 9x + 13)^7}$ .

{10 pts.} 7. Let  $f(x) = -|x - 4| + 5$ .

(a) List the transformations needed to obtain the graph of  $f$  starting from the graph of  $y = |x|$ .

(b) Sketch the graph of  $f$  labeling at least three points on the graph.



(c) State the domain and range of  $f$ .

{15 pts.} 8. Let  $f(x) = 2x^2 - 5x + 3$ ,  $g(x) = \frac{3}{2x - 7}$ , and  $h(x) = \frac{x + 1}{x - 1}$ .

(a) Evaluate  $(f \circ g)(1)$ .

(b) Find and simplify  $g \circ h$ .

{5 pts.} **Extra Credit.** Solve for  $x$ :

$$x = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{x}}}$$