

Name:

10/20/06

Math 111 Exam 1

1. (3pts each) True or False

(a) The point $(0, 5)$ is on the graph of the function with rule $f(x) = \frac{x^2-10}{2}$.

(b) The range of the function g with rule $g(x) = 12(x - 3)^2 - 6$ is $[-6, \infty)$.

(c) The slope between the points $(-2, 3)$ and $(4, -9)$ is 2.

(d) If $(f \circ g)(x) = (g \circ f)(x)$ then f and g are inverse to one another.

(e) If f is an odd function and $f(5) = 7$, then we know the point $(-5, -7)$ is on the graph of f .

2. (3pts each) Fill in the blank.

(a) If $f(x) = 4x^2$ and $g(x) = 2 + x$ then $(f \circ g)(-4) =$ _____.

(b) If $f(x) = 5$ then $3f(x^2 - 3x + \sqrt{x}) - 1 =$ _____.

3. (10pts) Find the center and radius of the circle

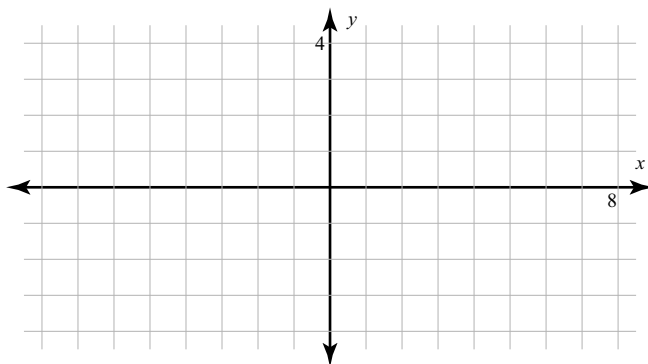
$$x^2 - 10 = 4y - y^2$$

4. (10pts) Consider the function f with rule

$$f(x) = \frac{1}{x} - \frac{3+x}{\sqrt{5-2x}}$$

Write the domain of f using interval notation.

5. (10pts) Sketch a graph of the function g where $g(x) = -x^2 + 6x - 5$.



6. (10pts) Solve the following equation for x

$$x(4 - x) = x - 10$$

7. (10pts) Suppose f is the one-to-one function with rule $f(x) = -(x^5 + 6)$. Find $f^{-1}(x)$.

8. (10pts) Suppose $f(x) = -x^2 + 4x - 12$. Compute and simplify the difference quotient.

$$\frac{f(x+h) - f(x)}{h}$$

9. (10pts) Find the rule of the linear function f whose graph contains the point $(6, -7)$ and is perpendicular to the graph of $y = 3x - 32$.

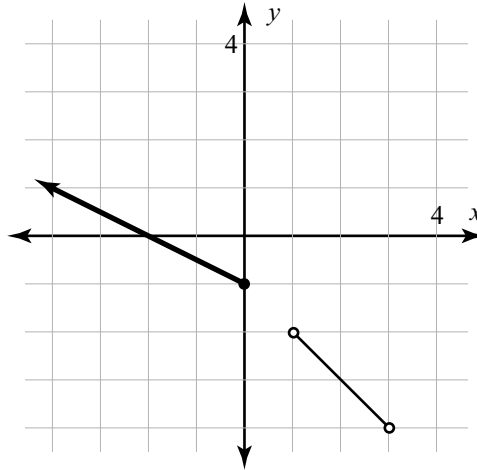
10. (10pts) Suppose $g(x) = 12x^7 + x|x|$. Is g even, odd, or neither?

11. (10pts) Suppose f is a function with rule $f(x) = 2x^2 - 3x$. Now suppose g is a function and the graph of g is obtained from the graph of f by performing the following graph transformations in order.

- i Reflecting in the y -axis.
- ii Shifting up 3 units.
- iii Stretching vertically by a factor of 4.
- iv Shifting to the right 2 units.

Write the rule of g and be sure to simplify your answer.

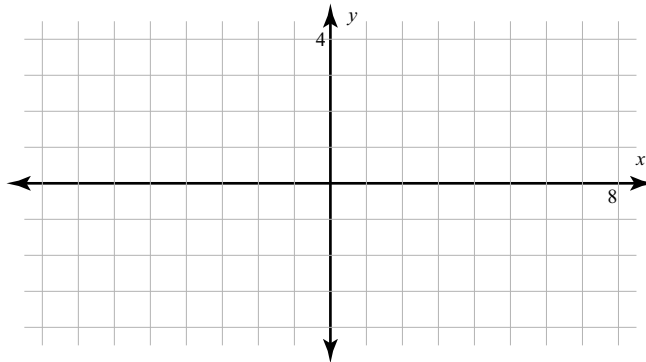
12. (10pts) Sketch the graph of f^{-1} on the same axis as the graph of f below.



13. Suppose $f(x) = -x - 2$.

(a) (5pts) Use the round trip theorem to show that $f^{-1} = f$
(in other words f is its own inverse.)

(b) (5pts) Sketch a graph of f below.



(c) (5pts) Using complete sentences explain how part (a) relates to your answer for part (b).

Bonus. (10pts) Suppose f is a one-to-one function with domain $(-\infty, \infty)$ which is also odd. Also, assume the point $(5, -2)$ is on the graph of f . Compute

$$f^{-1}(2) + (f \circ f^{-1})(3)$$

[You must justify your answer to receive full credit.]