

Name:

4/25/05

Math 111 Exam 1

For this exam assume all functions have domain and range some subset of the real numbers. Be sure to show all your work in a clear and organized manner, to indicate your answers.

1. (3pts each) True or False

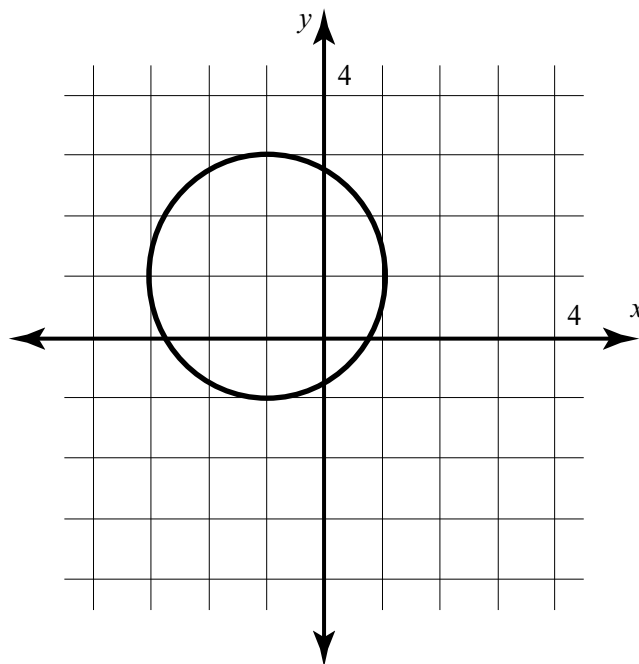
(a) If f is the function whose rule is given by $f(x) = x + 1$, then $f^{-1}(x) = x - 1$.

(b) A linear function with positive slope is increasing on $(-\infty, \infty)$.

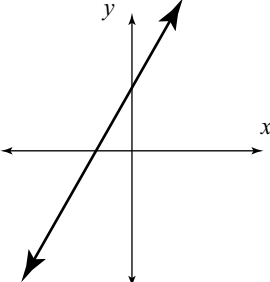
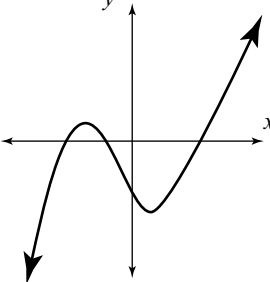
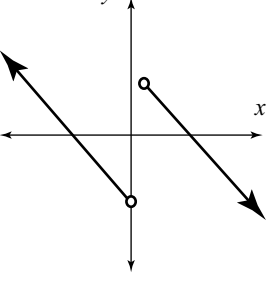
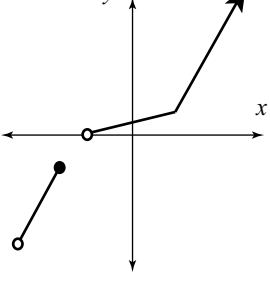
(c) If f is an even function and the point $(2, 6)$ is on the graph of f , then the point $(-2, 6)$ must also be on the graph of f .

(d) If $t = 0.75w$, then t is inversely proportional to w with constant of proportionality 0.75.

2. (10pts) Give the equation of the circle pictured below.



3. (8pts) Indicate whether or not the functions corresponding to the following graphs have inverses.

<p>has an inverse</p>  <p>does not have an inverse</p>	<p>has an inverse</p>  <p>does not have an inverse</p>
<p>has an inverse</p>  <p>does not have an inverse</p>	<p>has an inverse</p>  <p>does not have an inverse</p>

4. (10pts) Consider the functions f and g whose rules are given below. Give the domain of each in interval notation.

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

$$g(x) = \frac{3x - 2}{x^2 - 5x + 4}$$

5. (10pts) Recall the difference quotient is given by

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

Compute and simplify the difference quotient of the function f where

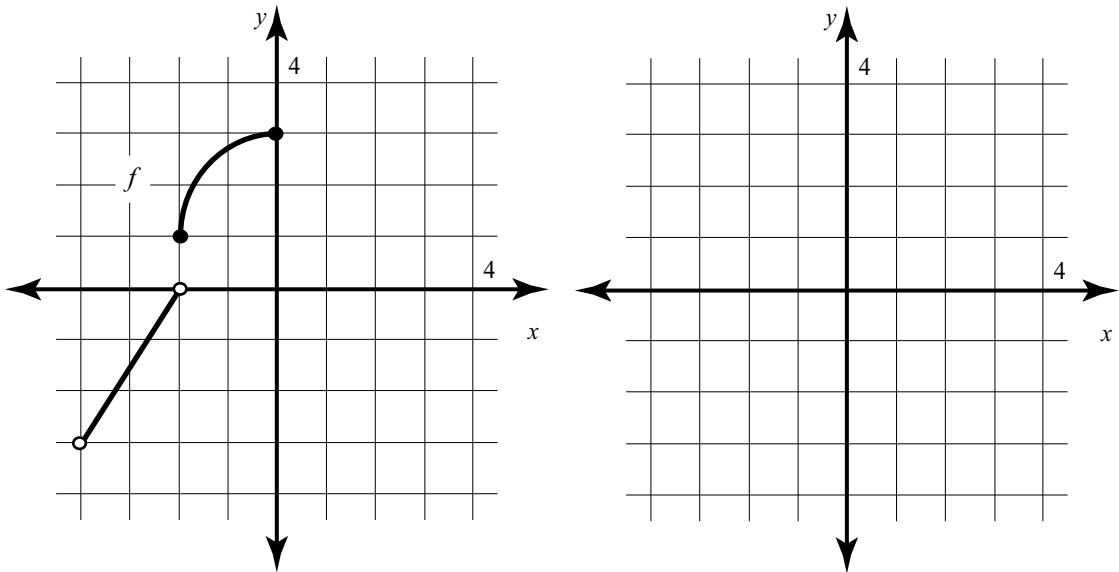
$$f(x) = 3x^2 + 7$$

6. (10pts) Find the rule of f^{-1} where f is the one-to-one function whose rule is given by

$$f(x) = \frac{x^3}{3 - x^3}$$

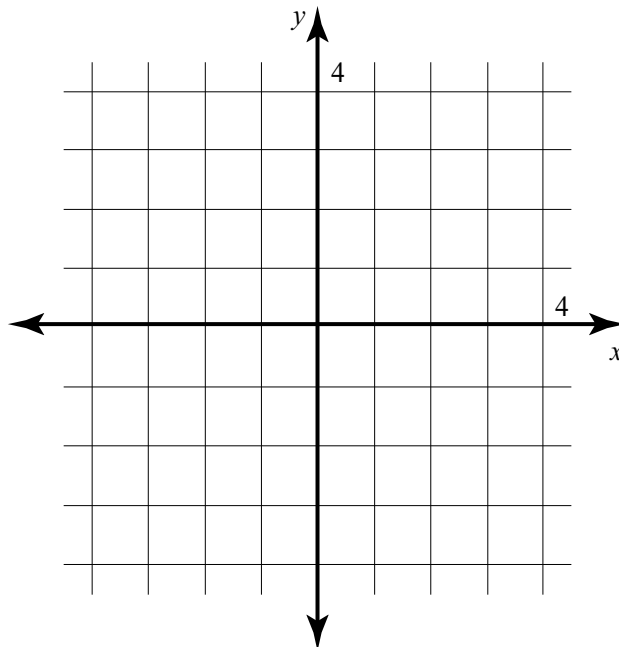
7. (10pts) Let f be the function whose graph is given on the left. On the right, sketch a graph of the function g whose rule is given by

$$g(x) = -f(x) + 1$$



8. (10pts) Sketch a graph of the function f whose rule is given by

$$f(x) = \begin{cases} x, & \text{if } -3 \leq x < -2; \\ 2, & \text{if } -2 < x \leq 0; \\ x^2, & \text{if } x > 0. \end{cases}$$



9. (10pts) Let f be the function whose rule is given by

$$f(x) = 2x^3 - 5x + 1$$

Is f even, odd, or neither? (You will receive no credit unless you justify your answer)

10. (10pts) Suppose f and g are one-to-one functions which satisfy the following

$$f(1) = 3, \quad f(3) = -2, \quad g(3) = 4, \quad g(1) = 2.$$

Compute the following:

$$(g \circ f)(1)$$

$$(f + g)(3)$$

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

Bonus (10pts) Let f and g be as in problem 10. Suppose further that g is an odd function. Compute

$$(g \circ f^{-1} \circ g)(-1)$$