

## Homework #8 Part A

Please note that this is not to be turned in.

1. For each of the following, write down the inverse equation (also called the inverse relation), and graph both the original and the inverse equation:

(a):  $y = x^2 + 2$

(b):  $y = |x + 1|$

(c):  $y = \sin(x)$

2. Using the equation of a circle, explain why the inverse equation for a circle with radius  $r$  and center  $(a, b)$  is a circle with radius  $r$  and center  $(b, a)$ . In the case  $r = 1$  and  $(a, b) = (2, 5)$ , graph both of these circles and the line  $y = x$  on the same set of axes.

3. For each of the functions  $y = f(x)$  below, find the inverse function  $y = f^{-1}(x)$ . Graph both  $y = f(x)$  and  $y = f^{-1}(x)$  for each.

(a):  $f(x) = 2x - 3$

(b):  $f(x) = x^3 - 2$

(c):  $f(x) = e^x + 1$

4. For each of the functions  $y = f(x)$  below, find the inverse function  $y = f^{-1}(x)$ . You do not need to graph these.

(a):  $f(x) = e^{x^3} + 1$

(b):  $f(x) = [\ln(x^3 - 2)]^{1/5}$

(c):  $f(x) = \frac{1}{(e^x + 1)^3}$

5. Suppose  $y = f(x)$  and  $y = g(x)$  are both functions with inverse functions. Suppose also that  $f(1) = 2$ ,  $f(3) = -2$ ,  $g(1) = 0$ , and  $g(4) = 3$ . Evaluate the following.

(a):  $f^{-1}(2)$       (b):  $f(g^{-1}(0))$       (c):  $f^{-1}(f(1))$

(d):  $f^{-1}(g(4) - 5)$       (e):  $g^{-1}(f^{-1}(-2))$       (f):  $f^{-1}(f(8))$  (if 8 is in the domain of  $f$ )

(g):  $f^{-1}(-f(g^{-1}(3) - 1))$