

## Practice for the Nov. 29th midterm.

Mr. Neeman. 10A, November 24, 2011

#1. Consider the function  $f(x) = \frac{1}{2+x}$ .

(a) Find its inverse function,  $f^{-1}$ .

(b) Find  $f^{-1}(-1)$ .

#2. Consider the function  $f(x) = \frac{1}{2}x^5$ .

(a) Find its inverse function,  $f^{-1}$ .

(b) Find  $f^{-1}(16)$ .

#3. For each of the following pairs of functions, say whether or not they're inverses.

(a)  $f(x) = 5x - 2$  and  $g(x) = -5x + 2$

(b)  $f(x) = x^3 + 1$  and  $g(x) = \sqrt[3]{x-1}$

(c)  $f(x) = \frac{2}{x} - 1$  and  $g(x) = \frac{x}{2} + 1$

#4. Suppose  $L_1$  has equation  $y = \frac{1}{2}x - 1$

(a) Find the equation of the line,  $L_2$ , which is parallel to  $L_1$  and passes through the point  $(-1, -3)$ .

(b) Find the equation of the line,  $L_3$ , which is perpendicular to  $L_1$  and passes through the point  $(5, -\frac{7}{2})$ .

(c) Find the point of intersection between  $L_1$  and  $L_3$ .

(d) Find all the intersections of these lines with the axes.

(e) Sketch a diagram representing these lines and all the intersections found in (c) and (d).

(f) Find the area of the triangle formed by the line  $L_1$  and the axes.

#5. (a) Find the equation of  $L_1$ , the vertical line which passes through the point  $(3, 1)$ .

(b) Find the equation of a line,  $L_2$ , which is perpendicular to  $L_1$  and which passes through the point  $(-2, -1)$ .

(c) Find the point of intersection of  $L_1$  and  $L_2$ .

(d) Sketch a diagram showing these lines and  $L_3$ , the line whose equation is  $y = x - 1$

(e) Find the area of the triangle formed by the lines  $L_1$ ,  $L_2$ , and  $L_3$ .

(f) Find the midpoints of the triangle's three sides.

(g) Find the triangle's perimeter.

#6. Consider the function  $f : [-2, 3] \rightarrow \mathbb{R}$ , with  $f(x) = -\frac{1}{2}x + 2$ .

(a) Find the function's range.

(b) Sketch the function's graph, labelling any intersections with the axes.

(c) Is the function injective?

(d) Is the function surjective?

(e) Is the function bijective?

(f) What is the function's monotonicity?

#7. Consider the function  $f : \{-1, 0, 1, 4\} \rightarrow \{-2, 0, 1, 2, 6, \}$ , with  $f(-1) = 0$ ,  $f(0) = 2$ ,  $f(1) = 6$ , and  $f(4) = -2$ .

- (a) Find the image of 0.
- (b) Find any preimages of 0.
- (c) Find the function's range.
- (d) Is the function injective?
- (e) Is the function surjective?
- (f) Is the function bijective?