

# Honors Analysis

Copy original problem.

Name \_\_\_\_\_

Per \_\_\_\_\_

Date \_\_\_\_\_

Convince *me* that **you** understand the concept!

*No Calculators.*

## Chapter 1 Exam

### I

Determine the domain for each of the following functions.

(5 pts ea)

a)  $A(x) = \sqrt{9 - x^2}$

b)  $B(x) = \sqrt{1 + \frac{1}{x-1}}$

c)  $C(x) = \sqrt{25}$

d)  $D(x) = \sqrt{x^2 - x - 2}$

### II

For each of the following, re-define as a “piece-wise” function. Sketch the graph. Specifically state the range of the function.

(10 pts ea)

a)  $A(x) = \operatorname{sgn}(x - 1) - |x + 1|$

b)  $B(x) = x + |x| + x \operatorname{sgn}(x)$

### III

Given  $f(x) = \frac{x + 4}{x^2 + x - 12}$  and  $g(x) = \frac{(4 - x)^2}{(x - 3)(x + 2)}$ . Determine the domain for each of the following

(Do not actually compute the formula for the new functions.):

(10 pts ea)

a)  $A(x) = \sqrt{\frac{1}{g(x)}}$

b)  $B(x) = f(f(x))$

c)  $C(x) = \sqrt{f(x) - g(x)}$

### IV

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

(20 pts tot)

a) Determine the formula for  $h(x)$ .

b) Prove  $h(x)$  is a 1 : 1 function.

### V

Given:  $A(0, 2)$ ,  $B(-3, 0)$ ,  $C(9, 1)$ ,  $D(-6, -9)$ ,

(5 pts ea)

a) Prove the line segment  $\overline{AB}$  is parallel to the line segment  $\overline{CD}$ .

b) Find the length of the line segment  $\overline{BC}$

**Extra Credit ----- 5 pts -----**

A train traveling at 100 miles per hour takes three seconds to enter a tunnel and an additional thirty seconds to pass completely through the tunnel.

1. What is the length of the train?

2. How long is the tunnel?

(Is it true that the more math you know, the harder it is to do arithmetic?)