**Math 108**
Homework #2

Name ANSWER KEY
Due at the beginning of class Monday, February 2, 2009

Show all work neatly. Put your answers in boxes

1. Let $g(x) = x^2 - 2x$. Calculate and simplify as much as possible the difference quotient: $\frac{g(x+h)-g(x)}{h}$ = $\frac{(x+h)^2 - 2(x+h) - (x^2-2x)}{h}$ = $\frac{x^2+2xh+h^2-2x-2h-x^2+2x}{h}$ =

4 pts.

$\frac{h(2x+h-2)}{h}$ = $\boxed{2x+h-2}$

2. Given the functions $f(x) = \sqrt{3x+1}$ and $g(x) = x^2 + 2$, find the following:

a) $f(g(x)) = f(x^2+2) = \sqrt{3(x^2+2)+1} = \sqrt{3x^2+6+1} = \sqrt{3x^2+7}$ 2

b) $g(f(x)) = g(\sqrt{3x+1}) = (\sqrt{3x+1})^2 + 2 = 3x+1+2 = 3x+3$ $(x \geq -1/3)$ 2

3. What is the **domain** of each of the following functions?

a) $f(x) = 12x^5 - 9x^4 + 3x^3$ Domain = $\mathbb{R}$ (a polynomial, no problems) 2

b) $g(x) = \frac{2x+1}{2x^2-32}$ Domain = $\{x \mid x \neq 4, x \neq -4\}$ 2

let $2x^2-32=0 = 2(x^2-16) = 2(x+4)(x-4)$
(solve for points to exclude). $x = -4, x = 4$

c) $f(x) = \sqrt{4-x}$ Domain = $\{x \mid x \leq 4\}$ 2

$4 - x \geq 0$ (solve directly for domain)
$4 \geq x$

4. Consider the points $(3,1)$ and $(1,7)$:

a) What is the slope of the line through the two points?

$\frac{7-1}{1-3} = \frac{6}{-2} = -3 = m$ 2

b) What is the equation, in slope-intercept form, of the line through the points?

$y - 1 = -3(x-3) = -3x+9$ $\boxed{y = -3x+10}$ 2

or solve for b: $1 = -3(3)+b = -9+b$
$b = 10$
so $\boxed{y = -3x+10}$

c) What is an equation (in any form) of the line through (-2, 1) and parallel to the line above?

$m = -3$, so $y - 1 = -3(x-(-2)) = -3(x+2)$ 2

or

$y - 1 = -3x - 6$
$\boxed{y = -3x-5}$

or solve for b!

$1 = -3(-2)+b = 6+b$
$b = -5$, so $\boxed{y = -3x-5}$