Name: SOLUTIONS

Bonus Quiz for TEST 2 (201-009-50)
Functions & Trigonometry
Instructor: Emilie Richer
Date: October 22nd 2009

Scientific calculator is permitted.

SHOW ALL YOUR WORK.

Question 1 *(5 marks)*
Rationalize the denominator and simplify.

$$\frac{7+3\sqrt{5}}{2-\sqrt{5}} = \frac{(7+3\sqrt{5})(2+\sqrt{5})}{(2-\sqrt{5})(2+\sqrt{5})}$$

$$= \frac{14+6\sqrt{5}+7\sqrt{5}+15}{4-5}$$

$$= \frac{29+13\sqrt{5}}{-1} = \boxed{-29-13\sqrt{5}}$$

Question 2 *(4 marks)*
Find the domain of the following functions

(a) *(1 marks)* $f(x) = \sqrt{1-x}$
(b) *(1 marks)* $f(x) = \frac{4}{\sqrt{1-x}}$

(c) *(2 marks)* $f(x) = \frac{1}{2x^2 - 5x - 3}$

(a) $(-\infty, 1]$

(b) $(-\infty, 1)$

(c) $2x^2-5x-3 = 2x^2-6x+x-3$
$= 2x(x-3)+1(x-3)$
$= (x-3)(2x+1)$

$\mathbb{R} \setminus \{-\frac{1}{2}, 3\}$

Question 3 *(6 marks)*

Given the functions $f(x) = \frac{2}{x}$ $\quad g(z) = -z^2 - 1$ $\quad h(t) = t^2 - t + 2$

Find the following:

(a) $(f \circ h)(2x)$

(b) $(g \circ h)(-1) + (f \circ g)(2)$

(a) $f(h(2x))$

$= f((2x)^2 - 2x + 2)$

$= f(4x^2 - 2x + 2)$

$= \frac{2}{4x^2 - 2x + 2} = \boxed{\frac{1}{2x^2 - x + 1}}$

(b) $g(h(-1)) + f(g(2))$

$= g((-1)^2 + 1 + 2) + f(-2^2 - 1)$

$= g(4) + f(-5)$

$= (-4^2 - 1) + \frac{2}{-5}$

$= -17 - 2/5$

$= -\frac{85}{5} - \frac{2}{5} = \boxed{\frac{-87}{5}}$