Dawson College: **Functions and Trigonometry**: 201-009-50-C02: Fall 2008

Name: _____
Student ID: _____

Test 2

This test is graded out of 50 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work.

Question 1. Let $f(x) = -2x^2 + 3x + 2$, then find

a. *(1 marks)* $f(4)$

b. *(3 marks)* x if $f(x) = 2$

Question 2. *(1 mark)* If $f(x)$ is injective and $f(5) = 0$ then find $f^{-1}(0)$.

Question 3. *(4 marks)* Find the equation of the line that passes through the point $(1,2)$ and $(5,6)$.

Question 4.

a. *(4 marks)* Find the *distance* and the *midpoint* of the line segment joining the points $(2,1)$ and $(5,3)$.

b. *(2 marks)* Find the equation of the circle whose center is $(2,3)$ and has a radius of 5.

Question 5. *(4 marks)* Use the x and y intercepts to sketch the graph the linear function.

$$3x - 2y = 18$$

Question 6. Let $f(x) = 2x^2 - 2x + 1$ and $g(x) = \frac{x}{4x+1}$.

a. *(4 marks)* Determine $\frac{f(x+h)-f(x)}{h}$ and simplify.

b. *(1 marks)* Determine the domain of $g(x)$.

c. *(2 marks)* Determine $(f \circ g)(x)$ and $(g \circ f)(x)$. *Do not simplify.*

d. *(2 marks)* Determine $(g \circ f)(1)$.

e. *(bonus 1 mark)* Determine the range of $g(x)$.

Question 7. Let $f(x) = x^2 + 2x - 5$ be a quadratic function.

a. *(2 marks)* Determine the vertex of $f(x)$.

b. *(1 mark)* Determine the orientation of the parabola and state whether the vertex is a minimum or maximum.

c. *(1 mark)* Determine the *y*-intercept.

d. *(2 marks)* Determine the *x*-intercept(s).

e. *(1 mark)* Sketch the graph of $f(x)$.

f. *(1 mark)* Determine if $f(x)$ is injective and justify.

g. *(2 marks)* Determine the domain and range of $f(x)$.

Question 8. *(4 marks)* Sketch the graph defined by

$$f(x) = \begin{cases} x^2 + 1 & \text{if } x \leq 0 \\ \sqrt{x} & \text{if } x > 0 \end{cases}$$

Question 9. *(4 marks)* Find the equation of the line that passes through the point $(2,3)$ and is parallel to the line $x + 2y = 4$.

Question 10. *(4 marks)* If $f(x) = \frac{x+1}{x-2}$ then find $f^{-1}(x)$.

Bonus. *(4 marks)* Find the quadratic function whose graph passes through the points $(0,4)$, $(1,4)$ and $(-1,6)$.