PRINCE SULTAN UNIVERSITY

MATH 111 CALCULUS

MAJOR EXAM 2 23rd DECEMBER 2008

Time allowed: 50 minutes

Name: _____

I.D. _____

Instructors Name: _____ **Section:** _____

1. Answer all questions
2. This exam consists of 1 Cover Sheet & 2 Question Sheets with 9 questions.
3. You can use a calculator, **NOT** a mobile phone.
4. No talking during the test.
5. Show all working out in the space provided.

Question No.	Max. Points	Points Scored
1	6	
2	6	
3	12	
4	6	
5	8	
6-9	12	
TOTAL SCORE	50	

1) [6 points] Let $f(x) = x^2 + 1$. Use the definition of the derivative to find $f'(x)$.

2) [6 points] Find the equation of the tangent line to the graph of $y = x^3 - 2\sqrt{x}$ at $x = 1$.

3) [12 points] Find $\frac{dy}{dx}$

(a) $y = 3x^2 - \frac{1}{x} + 2x + 5$

(b) $y = x\cot x - 2\csc x$

(c) $y = \frac{5 - \cos x}{5 + \sin x}$

4) [6 points] Show that $y = \sec x$ satisfies $y'' - (\tan x)y' - y^3 = 0$.

5) [8 points] Given that $f(4) = 1,\ f'(4) = -1,\ g(x) = 3x^2 - 5f(x),$ and $h(x) = \dfrac{1 + xf(x)}{2x - 7}$. Find

(a) $g'(4)$

(b) $h'(4)$

● From Q6 to Q9 (3 points each) put a circle around the correct answer

6) If $f(t) = t^2 + 3t + 5$ is the position function of an object at time *t*, where *f*(*t*) is in feet and *t* in seconds, then the average velocity of the object over the interval [1,3] is

(a) $-\dfrac{2}{3}$ ft/sec (b) 5 ft/sec (c) 6 ft/sec (d) 7 ft/sec (e) $\dfrac{23}{2}$ ft/sec

7) $\lim\limits_{x \to 0} \dfrac{\sin^2 2x}{x \tan x} =$

(a) 4 (b) 1 (c) 2 (d) $\dfrac{1}{4}$ (e) does not exist

8) $\lim\limits_{x \to 0} \dfrac{1 - \cos(9x)}{x^2} =$

a) $\dfrac{9}{2}$ (b) $\dfrac{81}{2}$ (c) 81 (d) 0 (e) 1

9) The graph of $y = \dfrac{x^2 - 1}{x^2 + 1}$ has a horizontal tangent line at the point

(a) (0,0) (b) (0,1) (c) (-1,0) (d) (1,0) (e) (0,-1)