PRINCE SULTAN UNIVERSITY

MATH 111 CALCULUS

MAJOR EXAM 2 6th JANUARY 2010

Time allowed: 75 minutes

Name: _____

I.D. _____

Instructors Name: _____ **Section:** _____

1. Answer all questions
2. This exam consists of 1 Cover Sheet & 3 Question Sheets with 7 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	5	
2	21	
3	5	
4	5	
5	5	
6	5	
7	4	
TOTAL SCORE	50	

1) [5 points] Let $f(x) = x^2$. Use the definition of the derivative to find $f'(x)$.

2) [21 points] Find $\frac{dy}{dx}$

(a) $y = (2x^2 + x - 1)^4$

(b) $y = 3\sqrt[3]{x} + e^{2x} - 2\log x$

(c) $y = \frac{\sin x}{1 + \cos x}$

(d) $y = \sqrt{x + \tan(5x)}$

(e) $y = \sec^2(2x) + 2^{-x}$

(f) $y = 2x\tan^{-1}x - \ln(1+x^2)$

(g) $x^2 + 2xy - y^2 + x = 2$ (Use implicit differentiation)

3) [5 points] Find the equation of the tangent line to the curve $y = 2x^2 - x + 1$ at $x = 1$.

4) [5 points] Show that $y = xe^x$ satisfies $y'' - 2y' + y = 0$.

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

6) [5 points] Given that $y=\dfrac{\csc^3(x)\sin^{-1}x}{\sqrt{x}}$. Use logarithmic differentiation to find y'.

7) [4 points] The radius of a circle decreases at a constant rate of 4cm/min. Find the rate of change of the area of this circle when the radius is 6 cm. (Hint: The area of the circle $A=\pi r^2$)