PRINCE SULTAN UNIVERSITY

MATH 111 CALCULUS

MAJOR EXAM 3 24th MAY 2008

Start: **4:00 p.m.**
End: **5:15 p.m.**

Name: _____

I.D. _____

1. Answer all questions
2. This exam consists of 1 Cover Sheet & 3 Question Sheets with 8 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
1,2,3	18	
4,5,6	16	
7,8	16	
TOTAL	**50**	
TOTAL	**100**	

1) [6 points] Given that $y = \dfrac{x^2}{1+\log x}$, find $\dfrac{dy}{dx}$

2) [6 points] A 17-ft ladder is leaning against a wall. If the bottom of the ladder is pulled along the ground away from the wall at a constant rate of 5 ft/s, how fast will the top of the ladder be moving down the wall when it is 8ft above the ground?

3) [6 points] Given that $y = \dfrac{\sqrt[3]{x^2-8}\sqrt{x^3+1}}{x^6-7x+5}$, find $\dfrac{dy}{dx}$.

4) [6 points] Given that $y = \left(x^2 + 3\right)^{\ln x}$, find $\frac{dy}{dx}$.

5) [6 points] Given that $y = \frac{e^x - e^{-x}}{e^x + e^{-x}}$, show that $\frac{dy}{dx} = \frac{4}{\left(e^x + e^{-x}\right)^2}$.

6) [4 points] A stone dropped into a still pond sends out a circular ripple whose radius increases at a constant rate of 3 ft/s. How rapidly is the area enclosed by the ripple increasing at the end of 10s?

7) [6 points] Given $x^3 + x\tan^{-1} y = e^y$, show that $\dfrac{dy}{dx} = \dfrac{\left(3x^2 + \tan^{-1} y\right)\left(1+y^2\right)}{e^y\left(1+y^2\right) - x}$.

8) [10 points] Given that $y = e^{\sqrt{1+5x^3}} \sec^{-1}\left(\sqrt[5]{\dfrac{x-1}{x+1}}\right)$, find $\dfrac{dy}{dx}$.