	Calculus and Analytical Geometry II. Midterm	
Code : *Math 119* Acad.Year : *2008-2009* Semester : *Fall* Date : *1.12.2008* Time : *17:40* Duration : *120 minutes*	Last Name: Name : Student No: Department: Section: Signature:	
	7 QUESTIONS ON 6 PAGES TOTAL 100 POINTS	

1	2	3	4	5	6	7		

1.(15 points) Find the absolute maximum and absolute minimum values of f on the given interval

$$f(x) = x + 2x^{\frac{2}{3}}, \quad [-1, 1]$$

2.(10 points) Use the Mean value theorem to prove the inequality

$$\frac{|\sin(\cos(a)) - \sin(\cos(b))|}{|a-b|} \leq 1$$

for all a and b such that $a \neq b$.

3.(15 points) A piece of wire 10 m long is cut into two pieces. One piece is bent into a square and the other is bent into a circle. How should the wire be cut so that the total area enclosed is

(a) a maximum

(b) a minimum

4.(20 points) Use the guidlines for sketching a curve to graph the function $f(x) = \dfrac{x^2}{3x+6}$

5.(12 points) Evaluate

$$\frac{d}{dx}\left(\int_x^{x^2} \tan t \; dt + \int_1^{\sin \pi} \sqrt{1-t^3}\, dt\right)$$

6.(18 points) Evaluate the integrals

(a) $\int \sqrt{x^3+1}\, x^8\, dx$

(b) $\int_{-2}^{2} \dfrac{x^2 \sin x}{x^4-9}\, dx$

(c) $\int_{-2}^{5} \left|4x - x^2\right|\, dx$

7. (10 points) Prove that

$$\int_0^2 \sqrt{1+x^3}\,dx \leq 4$$

Hint: Show that $\sqrt{1+x^3}$ is concave upward on $[0,2]$