	Calculus and Analytical Geometry II. Midterm	
Code : *Math 119* Acad.Year: *2007-2008* Semester : *Fall* Date : *9.12.2007* Time : *10:00* Duration : *120 minutes*	Last Name: Name : Student No.: Department: Section: Signature:	
	6 QUESTIONS ON 6 PAGES TOTAL 100 POINTS	

1	2	3	4	5	6		

1. (5+5+5+5=20 points) Let $f(x) = \dfrac{x^2+4}{x^2-4}$

(a) Find the domain of f and its asymptotes, if any.

(b) Find the critical points of f, if any.

(c) Determine the intervals where f is concave up/down.

(d) Sketch the graph of f.

2. (10 points) Find the area of the largest rectangle that can be inscribed in a right triangle with perpendicular sides of length $3cm$ and $4cm$, if the two sides of the rectangle lie along these sides of the triangle.

3. (5+5+5=15 points) Evaluate each of the following integrals.

(a) $\int \frac{x^3}{(2x^4+7)^2} dx$

(b) $\int_0^{2\pi} \sqrt{|\sin\theta|^{119} + |\sin\theta| + 1} \cos\theta d\theta$

(c) $\int_1^2 (x + \frac{1}{x})^2 dx$

4. (a) (10 points) If $f(x)$ is differentiable, and $\int_0^x f(t)dt = f(x)^2$ for all x, find $f(x)$.

(b) (10 points) Find $F'(x)$ if $F(x) = \int_x^{2x} \frac{tdt}{t^3+1}dt$

5. (5+10=15 points)

(a) Sketch the region enclosed by $y = |x|$ and $y = x^2 - 1$.

(b) Find the area of the region.

6. (a) (10 points) Find the volume of the solid obtained by rotating the area bounded by $y = \sec x$, $y = 0$, $x = 0$ and $x = \pi/3$ around the x-axis.

(b) (10 points) Find the volume of the solid obtained by rotating the area bounded by $y = \dfrac{1}{(1+x^2)^2}$, $y = 0$, $x = 1$ and $x = 2$ around the y-axis.