Math 132 Midterm #2
Spring 2003

Your name   _____

ID number   _____

Your section   _____

Note:

- No notes, no books.
- It is **not sufficient** to simply write down the answers. You must **explain how** you arrive at your answers.
- You have **90 minutes.**

$$\sin^2 \theta = \frac{1 - \cos 2\theta}{2}, \ \ \cos^2 \theta = \frac{1 + \cos 2\theta}{2}$$

	GRADE	
#1	(a)	(b)
#2	(a)	(b)
	(c)	(d)
#3		
#4	(a)	(b)
	(c)	(d)
Total		

#1. Consider the parametric curve given by
$$x = t^2 - 1, \;\; y = t(t^2 - 1).$$
[10 points] (a) Determine all points (x, y) at which the parametric curve has *vertical* tangent.

[10 points] (b) Determine the equation of the tangent line at the point $(x, y) = (3, 6)$ of this parametric curve.

#2. [10 points] For each of the following integrals, determine whether it is convergent or divergent. Evaluate **algebraically** those that are convergent. Show your work!

(a) [5 points] $\displaystyle\int_0^1 \frac{dx}{x \ln x}$

(b) [5 points] $\displaystyle\int_0^{\pi/3} \tan^3 x \sec x \, dx$

(c) [5 points] $\displaystyle\int_{-2}^{2} \frac{dx}{(x-1)^2}$

(d) [5 points] $\displaystyle\int_{0}^{\infty} xe^{-x}dx$

#3. [10 points] Determine the area of the region that lies *inside* $r = 3\cos\theta$ and *outside* $r = 2 - \cos\theta$.

#4. For each of the following infinite series, determine whether or not it is convergent or not. For the ones that do converge, compute its sum. **Explaination your reasoning.**

(a) [5 points] $\displaystyle\sum_{n=1}^{\infty} \frac{7n^2 + 4n + 1}{6n^2 - 5n + 10}$

(b)[5 points] $\displaystyle\sum_{n=1}^{\infty} \frac{3^{2n}}{7^{n+1}}$

(c) [5 points] $\displaystyle\sum_{n=1}^{\infty}(-1)^n \frac{3^{n+2}}{4^{n-3}}$

(d) [5 points] $\displaystyle\sum_{n=1}^{\infty}\left(\frac{e}{n}-\frac{1}{e^n}\right)$