MARK BOX		
Problem	Points	You
1	30	
2	15	
3	15	
4	10	
5	10	
6	10	
7	10	
Total	100	

MATH 142.1 FALL 1991 EXAM 4

NAME: _____

SSN: _____

Instructions:

(1) To receive credit, you must work in a logical fashion, show all your work, and when applicable put your answer in the box (or on the line) provided.
(2) During this test, do not leave your seat. Raise your hand if you have a question. When you finish, turn your exam over, put your pencil down, and raise your hand.
(3) No "formula sheets" allowed. NO CALCULATORS ALLOWED!
(4) The "Mark Box" indicates the problems along with their points. Check that your copy of the exam has all of the problems.

1. Find the interval of convergence for each of the below power series. Do not forget to "check the endpoints." Has parts a), b), and c).

a) $\displaystyle\sum_{n=1}^{\infty} \frac{x^n}{n!}$ has interval of convergence _____ .

b) $\sum_{n=1}^{\infty} \frac{n!x^n}{10^n}$ has interval of convergence _____ .

c) $\sum_{n=1}^{\infty} \frac{(2x-6)^n}{5^n}$ has interval of convergence _____

2. Working through the steps below, find a power series representation for the given definite integral. For what values of x is this series valid? Express your answers in closed form.

a) $e^t = \sum_{n=}$

b) $1 - e^t = \sum_{n=}$

c) $\dfrac{1 - e^t}{t} = \sum_{n=}$

d) $\displaystyle\int_0^x \frac{1 - e^t}{t}\, dt = \sum_{n=}$ valid for _____.

⊛ Show your work below:

3. Approximate the sin(1 radians) accurate to two decimal places. Use a partial sum of fewest possible terms for which an appropriate estimate test guarantees the desired accuracy.

⊛ Answer sin(1 radians) ≈ _____

⊛ helpful computations:
⊛ $\frac{1}{3!} \approx .16667$
⊛ $\frac{1}{5!} \approx .00833$
⊛ $\frac{1}{7!} \approx .000198$
⊛ $\frac{1}{9!} \approx .000003$

4. Sketch the graph of the curve $r^2 = 4\cos\theta$.

5. On the same grid, sketch the curves $r = \sin\theta$ and $r = \cos\theta$.
The points of intersection of these two curves are _____.

6. Let A represent the area outside $r = 2$ but inside $r = 1 + 2\cos\theta$. See the sketch below. Express A as an integral. Do not evauluate the integral.

⊛ Answer A = _____ .

7. Elimate the parameter and then sketch the graph of the curve

$$x = 5\cos t \quad y = 3\sin t \quad \text{for} \quad 0 \le t \le \pi.$$

⊛ This curve is commonly called _____ .

⊛ If $0 \le t \le \pi$, then ____ $\le x \le$ ____ and ____ $\le y \le$ ____ .