Practice Test 2Afor Calculus II, Math 1502, September 22, 2013

PRINT Name:

PRINT Section:

PRINT Name of TA:

This test is to be taken without calculators and notes of any sorts. The allowed time is 50 minutes. Provide exact answers; not decimal approximations! For example, if you mean $\sqrt{2}$ do not write $1.414\ldots$. Show your work, otherwise credit cannot be given.
PRINT your name, your section number as well as the name of your TA on EVERY PAGE of this test. This is very important.

PRINT Name:

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I: (25 points) Consider the function e^{-x}.
a) Find the 4-th order Taylor polynomial $P_4(x)$ for e^{-x} and the corresponding remainder in Lagrange form.

b) Using the above result compute an approximate value, call it A, for $\frac{1}{e}$

c) Give an estimate on how accurate the value computed in b) approximates $\frac{1}{e}$, i.e., give a bound on

$$|\frac{1}{e} - A| \ ,$$

using the remainder found in a).

PRINT Name:

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II: Decide whether the following series converge or diverge. State which convergence test you are going to use.

a) (8 points)

$$\sum_{k=0}^{\infty} \frac{[k!]^2}{(3k)!}$$

b) (8 points)

$$\sum_{k=1}^{\infty} \frac{3^{k^2}}{k!}$$

c) (9 points)

$$\sum_{k=1}^{\infty} (2 + (-1)^k)(1 - \frac{1}{k})^{k^2}$$

PRINT Name:

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III: a) (9 points) Consider the alternating series

$$L = \sum_{k=0}^{\infty} (-1)^k 10^{-k^2}$$

Find the smallest value of N so that the N-th partial sum s_N satisfies $|L - s_N| < 10^{-16}$.

b) (8 points) Find the power series expansion for $\sinh x := \frac{1}{2}(e^x - e^{-x})$.

c) (8 points) Sum the series

$$\sum_{k=0}^{\infty} (k+2) 2^{-k}$$

PRINT Name:

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IV: Find the interval of convergence of the following power series. State which convergence test you are going to use for computing the radius of convergence.

a) (7 points)

$$\sum_{k=0}^{\infty} \frac{\sqrt{k!}}{k^k} x^k$$

b) (8 points)

$$\sum_{k=1}^{\infty} (-1)^k \frac{1}{k^3} \left(\frac{x+3}{2} \right)^k$$

c) (10 points)

$$\sum_{k=1}^{\infty} \frac{3+(-1)^k}{k} (x-1)^k$$

What function does this series represent in its open interval of converegence?