Calculus II
Exam 3, Summer 2003

Problems are worth 20 points each. You may use calculators and Tables of Integrals. You must show enough work to convince me that you know how to do the problems.

1. Find the limits:
a) $\lim_{x \to 0} x \ln x =$
b) $\lim_{x \to \pi/2} (x - \pi/2) \tan x =$

2. Find the definite integrals:
a) $\int_0^\infty x e^{-x^2} dx =$
b) $\int_0^2 \ln x \, dx =$
Hint; you may use your answer to Problem 1, part a).

3. Does the series converge or diverge? Give your reasoning.
a) $\sum_{n=1}^\infty \dfrac{n+1}{n^3}$
b) $\sum_{n=1}^\infty \dfrac{e^n}{n^e}$
c) $\sum_{n=1}^\infty \dfrac{2^n}{(3+\frac{1}{n})^n}$

4. Find the radius of convergence of the series:
a) $\sum_{n=1}^\infty \dfrac{2^n}{n} x^n$
b) $\sum_{n=1}^\infty \dfrac{2^n}{n!} x^n$

5. Find the Taylor series centered at the origin for the function

$$F(x) = \int_0^x \frac{dt}{1-t^4} \, .$$