Math 1220 Calculus II, Examination 3, October 30, November 1, 2003: Solutions

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). $\lim_{t\to\infty} \dfrac{t \ln t}{1+t^2} =$

b). $\lim_{x\to\pi/2} \dfrac{\cos x}{x - \frac{\pi}{2}} =$

2. Find the definite integrals:

a). $\displaystyle\int_0^\infty te^{-t}dt =$

b). $\displaystyle\int_0^2 \frac{dx}{\sqrt{x}} =$

3. Does the series converge or diverge? Give your reasoning.

a) $\displaystyle\sum_{n=1}^{\infty} \frac{n^2+1}{n^4-n^2+n}$

b) $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{e^n}$

c) $\displaystyle\sum_{n=1}^{\infty} \frac{e^{\cos(n\pi)}}{n^2}$

4. a) Let $f(x) = \sum_{n=0}^{\infty}(2^n - 1)x^n$. What is the radius of convergence of the series?

b). Write $f(x)$ in closed form (that is, as an algebraic expression).

5. For the Maclaurin series expansion:

$$\frac{t}{2-t^4} = \sum_{n=0}^{\infty} a_n t^n$$

find the values of a_0, a_1, a_2, a_3.