Calculus II
Exam 3, Fall 2002

1. Find the limits

a) $\lim\limits_{x \to e} \dfrac{\ln(x) - 1}{\ln(\ln x)}$

b) $\lim\limits_{x \to \infty} \dfrac{x(1 + 2x)}{3x^2 + 1}$

2. Does the integral converge or diverge? Give reasons. If you can, evaluate the integral.

a) $\displaystyle\int_0^1 \dfrac{dx}{x^{9/10}}$

b) $\displaystyle\int_0^\infty \dfrac{x}{1 + x^3} dx$

3. Does the series converge or diverge? Give reasons.

a) $\displaystyle\sum_{n=0}^\infty \dfrac{n(2^n - 1)}{3^n}$

b) $\displaystyle\sum_{n=0}^\infty \dfrac{1}{\ln(n)}$

4. What is the radius of convergence of the power series? Show your work.

a) $\displaystyle\sum_{n=0}^\infty (2^n - 1)x^n$

b) $\displaystyle\sum_{n=0}^\infty \dfrac{3^n}{n!}x^n$

5. Find the Maclaurin series for the function. **DO a) OR b).**

$$\text{a)} \quad \dfrac{1 + x}{1 - x} \qquad\qquad \text{b)} \int_0^x \dfrac{dt}{1 - t^3}$$