Math 201

Homework # 7, due February 21

I am sorry that the last homework, which I wanted to make shorter because of the Undergraduate Break Day, turned out to be a lot of work for you since it involved several new concepts. I hope that this homework will be a little bit lighter.

Problem 1 (4 points each)
Compute the radius of convergence of the following power series, using the Quotient Criterium:

(1) $\sum_{n=0}^{\infty} \frac{n}{3^n} x^n$.
(2) $\sum_{n=0}^{\infty} \frac{1}{n} x^n$.
(3) $\sum_{n=0}^{\infty} 3^n x^n$

Problem 2 (4 points each)
Compute the Taylor series about the point x_0 of the given function, and determine the radius of convergence:

(1) $\ln(x)$, $x_0 = 1$.
(2) x^3, $x_0 = -1$.
(3) $\cos(x)$, $x_0 = 0$.

Problem 3 (2 points each)
Shift the summation index of the following power series so that you get an expression of the form $\sum_{n=0}^{\infty}$ where the generic term involves x^n.

(1) $\sum_{n=2}^{\infty} n(n-1)a_n x^{n-2}$.
(2) $x(\sum_{n=1}^{\infty} n a_n x^{n-1}) + \sum_{n=0}^{\infty} a_n x^n$.
(3) $\sum_{n=1}^{\infty} n a_n x^n + x \sum_{n=0}^{\infty} 2a_n x^n$.

Problem 4 (5 points each)
Problems 1, 7, 8, 12 on page 259.

Bonus (10 points each)
Problem 6 on page 203
Problem 32 on page 67.