Calculus II ESP | **Spring 2013**

Power Series

Worksheet # 23

1. State that the following are true, or change them to be correct statements.
   (a) Any infinite series involving a variable is a power series.
   (b) A power series representing a function $f(x)$ always converges for every value of x.
   (c) If $\sum a_k x^k$ and $\sum b_k x^k$ converge absolutely on an interval I, then $\sum (a_k + b_k)x^k$ also converges on I.
   (d) There is a power series that converges for x in $[-1, 1]$ or $[2, 3]$ but not for x in $(1, 2)$.
   (e) If $\sum c_k x^k$ converges to $f(x)$ on an interval I, then the term-by-term derivative of the series converges to $f'(x)$ for all $x \in I$.

2. Find the interval of convergence of each of the following power series.
   (a) $\sum n! x^n$
   (b) $\sum \frac{\ln n}{n} x^n$
   (c) $\sum \frac{(-1)^{n+1}}{n \ln n}(x-3)^n$

3. Find power series representations for the following, and give the interval of convergence.
   (a) $\frac{1}{3+x}$
   (b) $\ln \sqrt{4 - x^2}$