Name: _____

Please show all work and box the answers.

1. (20 pts.) Determine whether the following series converge. Do 4 out of 5.

$$\text{(a) } \sum_{n=1}^{\infty} \frac{1}{1+2^n} \qquad \text{(b) } \sum_{n=1}^{\infty} \frac{n!}{n^n} \qquad \text{(c) } \sum_{n=1}^{\infty} \frac{\ln(n)}{\sqrt{n}}$$

$$\text{(d) } \sum_{n=1}^{\infty} \frac{(n!)^3}{(3n)!} \qquad \text{(e) } \sum_{n=1}^{\infty} \left(\frac{n}{n+1}\right)^{n^2}$$

2. (10 pts.) Evaluate the following sums.

$$\text{(a) } \sum_{n=2}^{\infty} \frac{(-1)^n}{2^n} \qquad \text{(b) } \sum_{n=0}^{\infty} \frac{2^n}{3^{n+1}}$$

3. (10 pts.) Find the interval of convergence of the power series

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}} (2x+3)^n$$

4. (15 pts.) Find the first k nontrivial terms of the Taylor series for $f(x)$ at $x = a$.

(a) $f(x) = \ln\left(2 + \frac{x}{2}\right)$, $a = -2$, $k = 2$,

(b) $f(x) = \frac{1}{1-x}$, $a = 0$, $k = 4$,

(c) $f(x) = \frac{x}{1+x^2}$, $a = 0$, $k = 4$.

1	2	3	4	total (55)	%