Math 143 Midterm 1

Name: _____

1. Do these series converge? If so, why?

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

b. $\sum_{n=0}^{\infty} \frac{5^n}{3^n + 4^n}$

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

2. Find the interval and radius of convergence for these series:

a. $\sum_{n=1}^{\infty} \frac{4^n}{2^n + 1} x^n$

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

3. Let $f(x) = \frac{4}{7}(1+x)^{7/2}$.

a. Find the degree 2 Taylor polynomial for $f(x)$ at $x = 0$.

b. Find a bound on the error when approximating $f(1/2)$ by taking $x = 1/2$ in part a.

4. By repeatedly taking derivatives, find the Taylor series for $1/(2x+3)$ centered at $x=-1$.