1. Carefully complete the following definitions. (This means copy them from the book.)
   a. A sequence is ...
   b. A sequence \( \{a_n\} \) converges if ...
   c. A series \( \sum_{n=0}^{\infty} a_n \) converges if ...

2. Determine whether these sequences converge. Name and demonstrate the test used.
   a. \( \left\{ \frac{3n^2+5}{2n^2+80n-3} \right\} \)
   b. \( \left\{ \frac{\sin\left(\frac{\pi}{n}\right)}{n} \right\} \)
   c. \( \left\{ \frac{\cos(n)}{\sqrt{n}} \right\} \)
   d. \( \left\{ 6 \ (-1.01)^n \right\} \)

3. Find the sum of these series exactly if they converge.
   a. \( \sum_{n=2}^{\infty} \frac{2n+1}{5^{n-1}} \)
   b. \( \sum_{n=1}^{\infty} \frac{12}{n^2+4n} \)

4. Determine whether these series converge. Name and demonstrate the test used.
   a. \( \sum_{n=1}^{\infty} \frac{n-1}{n^2+4n} \)
   b. \( \sum_{n=1}^{\infty} (-1)^n \frac{n-1}{n^2+4n} \) (Determine whether absolutely convergent, conditionally convergent or divergent.)
   c. \( \sum_{n=1}^{\infty} \frac{3n}{1+8n} \)
   d. \( \sum_{n=1}^{\infty} \left( \frac{3n}{1+8n} \right)^n \)
e. \[ \sum_{n=1}^{\infty} \frac{10^n}{n!} \]

f. \[ \sum_{n=1}^{\infty} \sin(n) \]

g. \[ \sum_{n=1}^{\infty} (-1)^n \frac{1}{n^2 + 1} \quad \text{(Determine whether absolutely convergent, conditionally convergent or divergent.)} \]

h. \[ \sum_{n=1}^{\infty} \frac{n+5}{5^n} \]

i. \[ \sum_{n=1}^{\infty} \frac{\cos\left(\frac{n}{2}\right)}{n^2 + 4n} \]

j. \[ \sum_{n=1}^{\infty} \frac{e^n}{n^2} \quad \text{(Use integral test.)} \]

k. \[ \sum_{n=1}^{\infty} \frac{(2n)^n}{n^{2n}} \]

Extra Credit:

l. \[ \sum_{n=1}^{\infty} \frac{1}{(\ln n)^{2n}} \]

m. \[ \sum_{n=1}^{\infty} (\sqrt{n} - 1) \]