Worksheet 10.2.
Infinite Series

1. Compute the partial sums S_2, S_4, and S_6 of $\sum_{k=1}^{\infty}(-1)^k k^{-1}$.

2. Calculate S_3, S_4, and S_5, and then find the sum of $S = \sum_{n=1}^{\infty} \frac{1}{4n^2-1}$ using the identity

$$\frac{1}{4n^2-1} = \frac{1}{2}\left(\frac{1}{2n-1} - \frac{1}{2n+1}\right)$$

3. Use Theorem 3 to prove that the series $\cos\frac{1}{2} + \cos\frac{1}{3} + \cos\frac{1}{4} + \cdots$ diverges.

4. Use the formula for the sum of a geometric series to find the sum $1+\frac{1}{5}+\frac{1}{5^2}+\frac{1}{5^3}+\cdots$ or state that the series diverges.

5. Use the formula for the sum of a geometric series to find the sum $\sum_{i=0}^{\infty}\frac{7\cdot 3^n}{11^n}$ or state that the series diverges.

6. Use the formula for the sum of a geometric series to find the sum $\sum_{i=0}^{\infty}\frac{8+2^n}{5^n}$ or state that the series diverges.

Worksheet 10.3.
Convergence of Series with Positive Terms

1. Use the Integral Test to determine if the infinite series $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^2}$ is convergent.

2. Use the Comparison Test to determine if the infinite series $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n} + 2^n}$ is convergent.

3. Use the Comparison Test to determine if the infinite series $\sum_{n=1}^{\infty} \frac{2}{3^n + 3^{-n}}$ is convergent.

4. Use the Limit Comparison Test to determine the convergence or divergence of the infinite series $\sum_{n=2}^{\infty} \frac{n^2}{n^4 - 1}$.

5. Use the Limit Comparison Test to determine the convergence or divergence of the infinite series $\sum_{n=2}^{\infty} \frac{n}{\sqrt{n^3 - 1}}$.