§9.5: The Comparison, Ratio, and Root Tests

1.] Determine if the following series converge or diverge using the Comparison Test:

a.) $\sum_{k=1}^{\infty} \frac{1}{k^2+4}$

b.) $\sum_{k=1}^{\infty} \frac{k^3}{2k^4-1}$

c.) $\sum_{k=2}^{\infty} \frac{\ln(k)}{k^2}$

2.] Determine if the following series converge or diverge using the Limit Comparison Test:

a.) $\sum_{k=2}^{\infty} \frac{1}{k^2-1}$

b.) $\sum_{k=1}^{\infty} \frac{k^4-2k^2+3}{2k^6-k+5}$

c.) $\sum_{k=3}^{\infty} \frac{\ln(k)}{k^2}$

3.] Determine if the following series converge or diverge using the Ratio Test:

a.) $\displaystyle\sum_{k=1}^{\infty} \frac{8^k}{k!}$

b.) $\displaystyle\sum_{k=1}^{\infty} \frac{k^k}{k!}$

4.] Determine if the following series converge or diverge using the Root Test:

a.) $\displaystyle\sum_{k=1}^{\infty} \left(\frac{3k^2-1}{8k^2+k}\right)^k$

b.) $\displaystyle\sum_{k=1}^{\infty} \frac{2^k}{k^9}$

5.] Determine if the following series converge or diverge:

a.) $\displaystyle\sum_{k=1}^{\infty} \left(1+\frac{2}{k}\right)^k$

b.) $\displaystyle\sum_{k=1}^{\infty} \frac{2^k k!}{k^k}$