1. Evaluate the following finite series: $\sum_{k=10}^{50} (3k-2)$.

2. Evaluate the following finite series: $\sum_{k=1}^{40} \left(\frac{1}{k+1} - \frac{1}{k+2}\right)$.

3. Evaluate the following finite series: $\sum_{k=2}^{40} \frac{1}{k^2+4k+3}$.

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4. Evaluate the following finite series: $\sum_{k=3}^{50} \left(\frac{1}{2}\right)^k$.

5. Evaluate the following series: $\sum_{k=2}^{\infty} \frac{1}{k^2+4k+3}$.

6. Evaluate the following series: $\sum_{k=3}^{\infty} \left(\frac{1}{2}\right)^k$.

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7. Show that the following series diverges: $\sum_{n=1}^{\infty} \frac{n^2+3}{4n^2+n+1}$.

8. Use the comparison test to determine the convergence or divergence of these series:

a) $\sum_{n=1}^{\infty} \frac{n+1}{n^3+2n+1}$ b) $\sum_{n=1}^{\infty} \frac{n}{\sqrt{4n^2+2}}$ c) $\sum_{n=1}^{\infty} \frac{3^n+2n}{10^n+100}$

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9. Use the limit comparison test to determine the convergence or divergence of these series:

a) $\sum_{n=1}^{\infty} \frac{n+1}{n^3+2n+1}$

b) $\sum_{n=1}^{\infty} \frac{n}{\sqrt{4n^2+2}}$

c) $\sum_{n=1}^{\infty} n^2 \sin\left(\frac{1}{n^3}\right)$

d) $\sum_{n=1}^{\infty} \frac{3^n+2n}{10^n+100}$

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10. Use the alternating series test to determine the convergence of the following series and then determine if they are conditionally convergent or absolutely convergent:

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

b) $\sum_{n=1}^{\infty} \frac{(-1)^n}{e^n}$

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

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11. Use the ratio test to determine the convergence of the following series: $\sum_{n=1}^{\infty} \frac{3^n}{n!}$.

12. Use the root test to determine the convergence of the following series: $\sum_{n=1}^{\infty} \frac{3^n}{2^n}$.

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