In Exercises 1 and 2, show that the series converges. Then find upper and lower bounds on the limit of the series.

1. $\displaystyle\sum_{m=1}^{\infty} \frac{1}{m\sqrt{1+m^2}}$

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

In Exercises 3-5, determine whether the series converges or diverges. If the series converges, find a number N such that the partial sum S_N approximates the sum of the series within 0.001. If the series diverges, find a number N such that $S_N \geq 1000$.

3. $\displaystyle\sum_{k=0}^{\infty} \frac{1}{k^2+3}$

4. $\displaystyle\sum_{k=0}^{\infty} \frac{1}{2+\cos(k)}$

5. $\displaystyle\sum_{m=2}^{\infty} \frac{\ln(m)}{m^3}$