1. Find the first four terms of the binomial series for the following functions.

   (a) $(1+x)^{-1/2}$

   (b) $(1-x^2)^{1/3}$

2. Find the binomial series for $\left(1-2x^6\right)^5$

3. Use an infinite series to approximate the following definite integrals to four significant digits.

   (a) $\int_0^1 e^{-x^2}\,dx$

(b) $\displaystyle\int_0^{0.2} \frac{x^3}{1+x^5}\,dx$

(c) $\displaystyle\int_0^{1} \frac{\sin x}{x}\,dx$

4. Use series representations to compute the following limits.

(a) $\displaystyle\lim_{x\to 3} \frac{5x^2-13x-6}{\ln(x-2)}$

(b) $\displaystyle\lim_{x\to 0} \frac{e^x-\cos x}{\frac{1}{1-2x}-\frac{1}{1+2x}}$