1. Evaluate the following limits.

   (a) $\lim\limits_{n\to\infty} \sqrt{\dfrac{6n+5}{3n+7}}$

   (b) $\lim\limits_{n\to\infty} \cos\left(\dfrac{n^2+1}{5n^3+2n+6}\right)$

   (c) $\lim\limits_{n\to\infty} \left(\dfrac{2}{5}\right)^n$

   (d) $\lim\limits_{n\to\infty} \left(\dfrac{6}{5}\right)^n$

   (e) $\lim\limits_{n\to\infty} \dfrac{4^n+7^{n+1}}{5^{n+2}+7^{n-1}}$

   (f) $\lim\limits_{n\to\infty} \dfrac{\cos(n^2)}{n+3}$

2. Let $a_1 = 3$ and $a_n = \frac{2}{3}a_{n-1} + 7$ for $n > 1$. Compute the first 5 terms of this sequence. Is the sequence increasing or decreasing? Compute $\lim\limits_{n\to\infty} a_n$.

3. For each infinite series, compute the first 6 terms and the first 6 partial sums. Put your results in a table, and round each number to 6 decimal places. Does the series appear to converge or diverge? (You may need to compute further partial sums.) If it converges, estimate the value of its sum.

   (a) $\sum\limits_{n=1}^{\infty} \dfrac{4}{n^4}$

   (b) $\sum\limits_{n=1}^{\infty} \dfrac{4}{\sqrt{n}}$

   (c) $\sum\limits_{n=1}^{\infty} \dfrac{n}{3^n}$

   (d) $\sum\limits_{n=1}^{\infty} \dfrac{2^n}{n}$

4. For each infinite series, find a formula for its Nth partial sum and use it to determine whether the series converges or divers. If it converges, find its sum.

   (a) $\sum\limits_{n=1}^{\infty} 2n+3$

   (b) $\sum\limits_{n=1}^{\infty} \dfrac{4}{\sqrt{n}} - \dfrac{4}{\sqrt{n+1}}$

   (c) $\sum\limits_{n=1}^{\infty} \dfrac{1}{2^n}$