2. The first few terms of a sequence (x_n) are given below. Assuming that the "natural pattern" indicated by these terms persists, give a formula for the nth term x_n.
(a) 5, 7, 9, 11, . . . ,
(b) 1/2, –1/4, 1/8, –1/16, . . .,
(c) 1/2, 2/3, 3/4, 4/5, . . . ,
(d) 1, 4, 9, 16, ...

3. List the first five terms of the following inductively defined sequences.
(a) $x_1 := 1, \quad x_{n+1} := 3x_n + 1,$
(b) $y_1 := 2, \quad y_{n+1} := \frac{1}{2}(y_n + 2/y_n),$
(c) $z_1 := 1, \quad z_2 := 2, \; z_{n+2} := (z_{n+1} + z_n)/(z_{n+1} - z_n),$
(d) $s_1 := 3, \quad s_2 := 5, \; s_{n+2} := s_n + s_{n+1}.$

4. For any $b \in \mathbb{R}$, prove that $\lim(b/n) = 0$.

5. Use the definition of the limit of a sequence to establish the following limits.

(a) $\lim\left(\dfrac{n}{n^2+1}\right) = 0,$
(b) $\lim\left(\dfrac{2n}{n+1}\right) = 2,$

(c) $\lim\left(\dfrac{3n+1}{2n+5}\right) = \dfrac{3}{2},$
(d) $\lim\left(\dfrac{n^2-1}{2n^2+3}\right) = \dfrac{1}{2}.$

6. Show that

(a) $\lim\left(\dfrac{1}{\sqrt{n+7}}\right) = 0,$
(b) $\lim\left(\dfrac{2n}{n+2}\right) = 2,$

(c) $\lim\left(\dfrac{\sqrt{n}}{n+1}\right) = 0,$
(d) $\lim\left(\dfrac{(-1)^n n}{n^2+1}\right) = 0.$