List the first five terms of the sequence.

1) $a_n = \dfrac{n+1}{3n-1}$

2) $a_n = \dfrac{3(-1)^n}{n!}$

3) $a_1 = 4, \quad a_{n+1} = \dfrac{a_n}{a_n - 1}$

Find a formula for the general term a_n of the sequence, assuming that the pattern on the first few terms continues.

4) $\dfrac{1}{2}, \dfrac{1}{4}, \dfrac{1}{8}, \dfrac{1}{16}, \ldots$

5) 2, 7, 12, 17, ...

6) $-\frac{1}{4}, \frac{2}{9}, -\frac{3}{16}, \frac{4}{25}, \ldots$

7) 5, 1, 5, 1, 5, 1, ...

Determine whether the sequence converges or diverges. If it converges, find the limit.

8) $a_n = n(n-1)$

9) $a_n = \frac{3+5n^2}{n+n^2}$

10) $a_n = \frac{2^n}{3^{n+1}}$

11) $a_n = \frac{n}{1+\sqrt{n}}$

12) $a_n = \frac{(-1)^n n^3}{n^3+2n^2+1}$

13) $a_n = \cos\left(n/2\right)$

14) $a_n = \dfrac{(2n-1)!}{(2n+1)!}$

15) $a_n = \arctan\left(2n\right)$

16) $a_n = \dfrac{e^n + e^{-n}}{e^{2n} - 1}$

17) $a_n = n^2 e^{-n}$

18) $a_n = \dfrac{\cos^2 n}{2^n}$

19) $a_n = \ln(n+1) - \ln(n)$

20) $a_n = n \sin\left(1/n\right)$

21) $a_n = \sqrt{n} - \sqrt{n^2 - 1}$

22) $a_n = \left(1 + \frac{2}{n}\right)^{1/n}$

23) 0, 1, 0, 0, 1, 0, 0, 0, 1, ...

24) $a_n = \frac{n!}{2^n}$

Determine whether the sequence is increasing, decreasing, or not monotonic. Is the sequence bounded?

25) $a_n = \frac{1}{5^n}$

26) $a_n = \frac{1}{2n+3}$

27) $a_n = n + \frac{1}{n}$

28) Find the limit of the sequence: $\sqrt{2}, \sqrt{2\sqrt{2}}, \sqrt{2\sqrt{2\sqrt{2}}}, ...$