1. For each of the following sequences, write the form of the general term a_n, starting your indexing at $n = 1$. Also determine whether each sequence is convergent or divergent. For those that are convergent, find the limit.

   (a) $\{1, 2, 3, 4, \ldots\}$
   (b) $\{2, -2, 2, -2, 2, \ldots\}$
   (c) $\{4, 7, 10, 13, \ldots\}$
   (d) $\{\frac{1}{2}, -\frac{1}{4}, \frac{1}{8}, -\frac{1}{16}, \ldots\}$
   (e) $\{-\frac{1}{2}, \frac{2}{3}, -\frac{3}{4}, \frac{4}{5}, \ldots\}$

2.

Determine whether the following series converge or diverge.

1. $\sum_{n=1}^{\infty} \frac{1}{2n}$
2. $\sum_{n=1}^{\infty} \frac{n+1}{2n-3}$
3. $\sum_{n=2}^{\infty} \frac{n^2}{n^2-1}$
4. $\sum_{n=1}^{\infty} \frac{n(n+2)}{(n+3)^2}$
5. $\sum_{n=1}^{\infty} \frac{1+2^n}{3^n}$
6. $\sum_{n=1}^{\infty} \frac{1+3^n}{2^n}$
7. $\sum_{n=1}^{\infty} \sqrt[n]{2}$
8. $\sum_{n=1}^{\infty} 0.8^{n-1} - 0.3^n$
9. $\sum_{n=1}^{\infty} \ln\left(\frac{n^2+1}{2n^2+1}\right)$
10. $\sum_{n=1}^{\infty} \cos^n(1)$
11. $\sum_{n=1}^{\infty} \tan^{-1}(n)$
12. $\sum_{n=1}^{\infty} \left(\frac{3}{5^n} + \frac{2}{n}\right)$
13. $\sum_{n=1}^{\infty} \left(\frac{1}{e^n} + \frac{1}{n(n+1)}\right)$
14. $\sum_{n=1}^{\infty} \frac{e^n}{n^2}$
15. $\sum_{n=2}^{\infty} \frac{2}{n^2-1}$
16. $\sum_{n=1}^{\infty} \frac{2}{n^2+4n+3}$
17. $\sum_{n=1}^{\infty} \frac{3}{n(n+3)}$
18. $\sum_{n=1}^{\infty} \ln\left(\frac{n}{n+1}\right)$
19. $\sum_{n=1}^{\infty} \left(e^{1/n} - e^{1/(n+1)}\right)$
20. $\sum_{n=1}^{\infty} \left(\cos\left(\frac{1}{n^2}\right) - \cos\left(\frac{1}{(n+1)^2}\right)\right)$
21. $\sum_{n=1}^{\infty} 6(0.9)^{n-1}$