Section 11.1

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Exercise 9

$$a_1 = 1 \quad a_{n+1} = 5a_n - 3$$

$$\begin{aligned} a_2 &= 5(1) - 3 = 2 \\ a_3 &= 5(2) - 3 = 7 \\ a_4 &= 5(7) - 3 = 32 \\ a_5 &= 5(32) - 3 = 157 \end{aligned}$$

Exercise 17

Given:

$$\left\{ \frac{1}{2}, -\frac{4}{3}, \frac{9}{4}, -\frac{16}{5}, \frac{25}{6} \right\}$$

Find a_n:

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

Exercise 25

$$a_n = \frac{n^4}{n^3 - 2n}$$

$$\begin{aligned} \lim_{n\to\infty} a_n &= \lim_{n\to\infty} \frac{n^4}{n^3 - 2n} \\ &= \lim_{n\to\infty} \frac{n^4}{n^3 - 2n} \frac{\frac{1}{n^3}}{\frac{1}{n^3}} \\ &= \lim_{n\to\infty} \frac{n}{1 - \frac{2}{n^2}} \\ &= \infty \end{aligned}$$

This sequence is divergent.

Exercise 29

$$a_n = \mathrm{e}^{\frac{-1}{\sqrt{n}}}$$

$$\begin{aligned}\lim_{n\to\infty} a_n &= \lim_{n\to\infty} \mathrm{e}^{\frac{-1}{\sqrt{n}}} \\ &= \mathrm{e}^0 \\ &= 1\end{aligned}$$

Exercise 33

$$a_n = \cos(\frac{n}{2})$$

$$\lim_{n\to\infty} a_n = \cos(\infty) = \text{undefined}$$

This sequence is divergent.

Exercise 36

$$a_n = \frac{(-1)^{n+1} n}{n + \sqrt{n}}$$

$$\lim_{n\to\infty} |a_n| = \lim_{n\to\infty} \frac{n}{n + \sqrt{n}} = 1$$

Since $\lim_{n\to\infty} |a_n| \neq 0$, $\lim_{n\to\infty} a_n \neq 0$, (Theorem).
Therefore, this sequence is divergent.

If you have any questions, comments, or concerns, please contact me at
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