

Section 11.1

Alvin Lin

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Problem 9

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

$$a_2 = 5(1) - 3 = 2$$

$$a_3 = 5(2) - 3 = 7$$

$$a_4 = 5(7) - 3 = 32$$

$$a_5 = 5(32) - 3 = 157$$

Problem 17

Given:

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

Find a_n :

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

Problem 25

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

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

This sequence is divergent.

Problem 29

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

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

Problem 33

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

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

This sequence is divergent.

Problem 36

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

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

Since $\lim_{n \rightarrow \infty} |a_n| \neq 0$, $\lim_{n \rightarrow \infty} a_n \neq 0$, (Theorem).

Therefore, this sequence is divergent.

If any errors are found, please contact me at alvin.lin.dev@gmail.com