

Homework 8 Solutions

9.1: 13,14,18,28-31,41,42,54

9.1.13.

$\lim_{n \rightarrow \infty} 2^n = \infty$. This sequence diverges to ∞ .

9.1.14.

$$\lim_{n \rightarrow \infty} (0.2)^n = \lim_{n \rightarrow \infty} \left(\frac{2}{10}\right)^n = 0 \text{ since } \left|\frac{2}{10}\right| \leq 1.$$

9.1.18.

$$\lim_{n \rightarrow \infty} \frac{2^n}{3^n} = \lim_{n \rightarrow \infty} \left(\frac{2}{3}\right)^n = 0 \text{ since } \left|\frac{2}{3}\right| \leq 1.$$

9.1.28.

$$s_1 = 1$$

$$s_2 = 2(1) + 3 = 5$$

$$s_3 = 2(5) + 3 = 13$$

$$s_4 = 2(13) + 3 = 29$$

$$s_5 = 2(29) + 3 = 61$$

$$s_6 = 2(61) + 3 = 125$$

9.1.29.

$$s_1 = 1$$

$$s_2 = 1 + 2 = 3$$

$$s_3 = 3 + 3 = 6$$

$$s_4 = 6 + 4 = 10$$

$$s_5 = 10 + 5 = 15$$

$$s_6 = 15 + 6 = 21$$

9.1.30

$$s_1 = 0$$

$$s_2 = 0 + \frac{1}{2} = \frac{1}{2}$$

$$s_3 = \frac{1}{2} + \frac{1}{4} = \frac{3}{4}$$

$$s_4 = \frac{3}{4} + \frac{1}{8} = \frac{7}{8}$$

$$s_5 = \frac{7}{8} + \frac{1}{16} = \frac{15}{16}$$

$$s_6 = \frac{15}{16} + \frac{1}{32} = \frac{31}{32}$$

9.1.31.

$$s_1 = 1$$

$$s_2 = 5$$

$$s_3 = 5 + 2(1) = 7$$

$$s_4 = 7 + 2(5) = 17$$

$$s_5 = 17 + 2(7) = 31$$

$$s_6 = 31 + 2(17) = 65$$

9.1.41.

$$s_1 = 1, s_n = s_{n-1} + n^2$$

9.1.42.

$$s_1 = 1, s_n = s_{n-1} + n$$

9.1.54.**(a)**

$$c_n = 82.459(1.013)^n$$

(b)

$$\begin{aligned}c_n - c_{n-1} &= 82.459(1.013)^n - 82.459(1.013)^{n-1} \\ &= 82.459(1.013)^{n-1}(1.013 - 1) \\ &= 0.013 \cdot 82.459(1.013)^{n-1}\end{aligned}$$

This is 1.3% of the consumption rate in the year previous to the n^{th} year. It is approximately the rate of increase for the oil consumption rate in the year $n-1$.

(c)

$365c_n$ is the total oil consumption in the n^{th} year following 2005. Therefore $\sum_{n=1}^{18} 365c_n$ gives the total consumption for the 18 years following 2005.