Chapter 6 – Sequences Practice SAC Solutions

Q1. $a = 400 + 250 = \$650$ with $d = \$250$

(a) Arithmetic sequence

(b) $t_1 = \$650$

$t_2 = \$650 + \$250 = \$900$

$t_3 = \$900 + \$250 = \$1150$

$t_4 = \$1150 + \$250 = \$1400$

$t_5 = \$1400 + \$250 = \$1650$

(c) $t_n = a + (n-1)d$

$t_n = 650 + (n-1)250$

$t_n = 650 + 250n - 250$

$t_n = 250n + 400$ where n – number of months

(d) $t_{10} = 250(10) + 400 = \$2900$

(e) One year means $n = 12$ months

$t_{12} = 250(12) + 400 = \$3400$

(f) $12000 = 250n + 400$

$\frac{12000 - 400}{250} = n$

$46.4 \text{ months} = n$

$\frac{46.4 \text{ months}}{12 \text{ months}} = 3.87 \text{ years}$

(g) $t_{n+1} = t_n + \$250$ where n is the number of months

Q2 $a = \$75000 - \$0.10 = \$74999.90 \quad d = -\$0.10$

(a) $t_1 = \$74999.90$

$t_2 = \$74999.80$

$t_3 = \$74999.70$

$t_4 = \$74999.60$

$t_5 = \$74999.50$

(b) $t_n = a + (n-1)d$

$t_n = 74999.90 + (n-1)(-0.10)$

$t_n = 74999.90 - 0.10n + 0.10$

$t_n = 75000 - 0.10n$ where n – distance travelled km

(c) $t_{50000} = 75000 - 0.10(50000)$

$t_{50000} = \$7000$

(d) Find the time it would take the taxi to depreciate to \$4500

$t_n = 75000 - 0.10n$

$4500 = 75000 - 0.10n$

$\frac{4500 - 7500}{-0.1} = n$

$705000\text{km} = n$ (total distance travelled when the taxi was 1st bought \$75000 to when it depreciates to \$4500)

Given the taxi is driven 20000 km in one year

So depreciation time is $\frac{705000 \text{ km}}{20000 \text{ km/year}} = 35.25 \text{ year} = 35\frac{1}{4} \text{ years}$

(e) $t_{n+1} = t_n - \$0.10/\text{km}$ where n is the distance travelled

Q3

(a) Geometric sequence

(b) 1st bounce $= \frac{60}{100} \times 8 = 4.8m$

2nd bounce $= \frac{60}{100} \times 4.8 = 2.88\ m$

3rd bounce $= \frac{60}{100} \times 2.88 = 1.728\ m$

4th bounce $= \frac{60}{100} \times 1.728 = 1.0368\ m$

5th bounce $= \frac{60}{100} \times 1.0368 = 0.62208\ m$

(c) $a = 4.8m$ $\quad r = \frac{2.88}{4.8} = 0.6$

$t_n = a \times r^{n-1}$

$t_n = 4.8 \times (0.6)^{n-1}$ where n is the number of bounce

(d) $t_{10} = 4.8 \times (0.6)^{10-1} = 0.04837\ m \simeq 48mm$

(e) $t_1 = 4.8 \times (0.6)^{n-1}$

$1 = 4.8 \times (0.6)^{n-1}$

Solve$(1 = 4.8 \times (0.6)^{n-1}, n)$

$n = 4.07$ that is after the 4th bounce

(f) $t_{n+1} = t_n \times r$

$t_{n+1} = t_n \times 0.6$

$t_{n+1} = 0.6 t_n$

Q4. (a) $I = \frac{PrT}{100} = \frac{900 \times \frac{8.2}{12} \times 1}{100} = \$6.15$ (4)

That is, the interest earn each month is \$6.15

$a = 900 + 6.15 = \$906.15$ and $d = \$6.15$

$t_n = a + (n-1)d$

$t_n = 906.15 + (n-1) \times 6.15$

$t_n = 906.15 + 6.15n - 6.15$

$t_n = 900 + 6.15n$

(b) $t_1 = 900 + 6.15(1) = \$906.15$

$t_2 = 900 + 6.15(2) = \$912.30$

$t_3 = 900 + 6.15(3) = \$918.45$

$t_4 = 900 + 6.15(4) = \$924.60$

$t_5 = 900 + 6.15(5) = \$930.75$

(c) $t_{20} = 900 + 6.15(20) = \$1023.00$

(d) Find time required to save \$ 1200

$t_n = 900 + 6.15n$

$1200 = 900 + 6.15n$

Solve $(1200 = 900 + 6.15n, n)$

$n = 48.78$ months

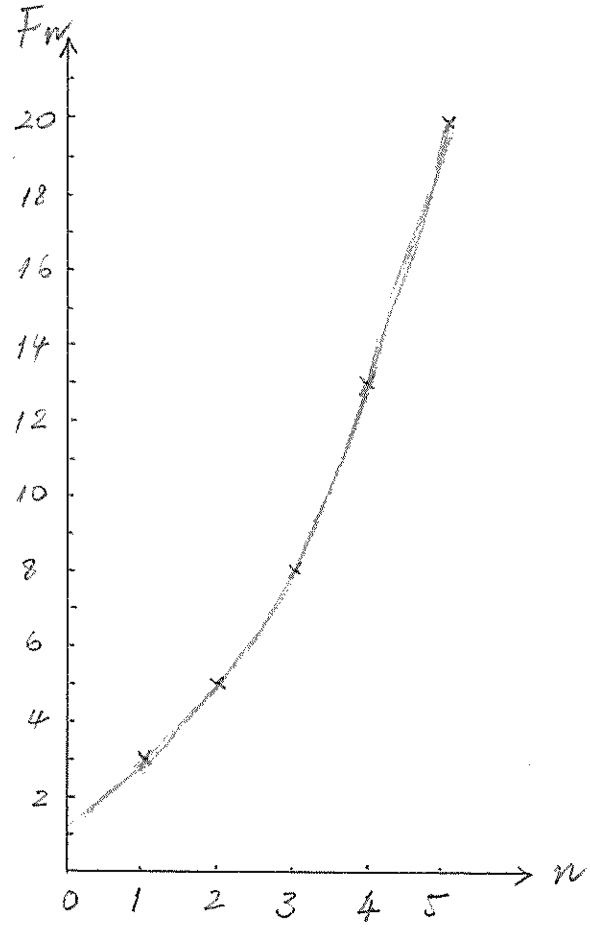
$n \simeq \frac{48.78 \text{ months}}{12 \text{ months}} = 4.065$ years

Q5 ⑤

(a) $F_{n+2} = F_n + F_{n+1}$, $F_1 = 3$ and $F_2 = 5$

(b)
$$\left.\begin{aligned} F_1 &= 3 \\ F_2 &= 5 \\ F_3 &= F_1 + F_2 = 3+5 = 8 \\ F_4 &= F_2 + F_3 = 5+8 = 13 \\ F_5 &= F_3 + F_4 = 8+13 = 21 \end{aligned}\right\} 3, 5, 8, 13, 21$$

(c)



(d) $F_{n+2} = F_n + F_{n+1}$, $F_1 = 2$ and $F_2 = 6$

(e) $F_1 = 2$, $F_2 = 6$, $F_3 = 2+6 = 8$, $F_4 = 6+8 = 14$

$F_5 = 8 + 14 = 22$ $\therefore 2, 6, 8, 14, 22$