

Solutions to end-of-chapter problems

Chapter 4

4.6 (a) Nominal; (b) Nominal; (c) Effective; (d) Nominal; (e) Effective; (f) Effective

4.16 (a) Interest rate per month = $(10/200)(100\%) = 5\%$

$$r = (5\%)(12) = 60\% \text{ per year}$$

$$\begin{aligned} \text{(b) } i &= (1 + 0.60/12)^{12} - 1 \\ &= 0.796 \text{ or } 79.6\% \text{ per year} \end{aligned}$$

4.18 (a) Interest rate per week = $(10/100)(100\%) = 10\%$

$$r = (10\%)(52) = 520\% \text{ per year}$$

$$\begin{aligned} \text{(b) } i &= (1 + 5.20/52)^{52} - 1 \\ &= 141.04 \text{ or } 14,104\% \text{ per year} \end{aligned}$$

$$\begin{aligned} \text{4.22 } F &= 260,000(F/P, 3\%, 12) \\ &= 260,000(1.4258) \\ &= \$370,708 \end{aligned}$$

4.26 In \$1 million units,

$$\begin{aligned} 28 &= 12(F/P, 3\%, 16) + x(F/P, 3\%, 12) \\ 28 &= 12(1.6047) + x(1.4258) \\ 1.4258x &= 8.7436 \\ x &= \$6.1324 \quad (\$6,132,400) \end{aligned}$$

4.32 First find savings at end of year 2011; use amount as an annual series for 10 years

$$\begin{aligned} \text{Savings at end of year 2011} &= 42,600(F/A, 0.5\%, 5)(F/P, 0.5\%, 3) \\ &= 42,600(5.0503)(1.0151) \\ &= \$218,391 \end{aligned}$$

$$\begin{aligned} F &= 218,391(F/A, 0.5\%, 10) \\ &= 218,391(10.2280) \\ &= \$2,233,708 \end{aligned}$$

4.47 A per 6 months = $900(6) = \$5400$ semiannually

$$\begin{aligned} P &= 5400(P/A, 7\%, 6) \\ &= 5400(4.7665) \\ &= \$25,739 \end{aligned}$$

4.53 $i = e^{0.10} - 1$
 $= 0.10517$ or 10.517% per year

$$P = 150,000 + 200,000(P/F, 10.517\%, 1) + 350,000(P/F, 10.517\%, 2)$$

Find factor values by interpolation, formula, or spreadsheet.

$$\begin{aligned} P &= 150,000 + 200,000(0.9048) + 350,000(0.8187) \\ &= \$617,505 \end{aligned}$$

4.56 In \$1 million units

$$\begin{aligned} P &= 1.7(P/F, 10\%, 1) + 2.1(P/F, 12\%, 1)(P/F, 10\%, 1) + 3.4(P/F, 12\%, 2)(P/F, 10\%, 1) \\ &= 1.7(0.9091) + 2.1(0.8929)(0.9091) + 3.4(0.7972)(0.9091) \\ &= \$5,714,212 \end{aligned}$$

4.57 (a)
$$\begin{aligned} P &= 100(P/A, 10\%, 5) + 160(P/A, 14\%, 3)(P/F, 10\%, 5) \\ &= 100(3.7908) + 160(2.3216)(0.6209) \\ &= 100(3.7908) + 160(1.4415) \\ &= \$609.72 \end{aligned}$$

(b)
$$\begin{aligned} 609.72 &= A(3.7908) + A(1.4415) \\ A &= 609.72/5.2323 \\ &= \$116.53 \text{ per year} \end{aligned}$$

4.69 Answer is (b)