

MA111 — Homework #10 Short Solutions

64. $p = \frac{0.08}{12} = 0.00667$. $T = 30(12) = 360$. $L = 10(1 + .00667) = 10.0667$.

$$\begin{aligned} F &= L \left[\frac{(1+p)^T - 1}{p} \right] \\ &= 10.0667 \left[\frac{(1+0.00667)^{360} - 1}{0.00667} \right] \\ &= \$15002.95. \end{aligned}$$

66. Same as problem 64 *except* that now $L = 10$ since the last payment earns no interest. \$14903.59.

68. \$12241.75.

70. $p = \frac{0.06}{12} = 0.005$. $T = 35(12) = 420$. $L = P$ since the last month's payment is at the end of the month and earns no interest.

$$\begin{aligned} F &= L \left[\frac{(1+p)^T - 1}{p} \right] \\ 1,000,000 &= P \left[\frac{(1+0.005)^{420} - 1}{0.005} \right] \\ 1,000,000 &= P(1424.71). \end{aligned}$$

So $P = \$701.90$.

72. Here money is just sitting and growing, so $F = P(1+r)^t$. $1172.59 = P(1+0.07)^{15} = 2.759$. So $P = \$425.00$.

74. (a) $F = 16$. $p = \frac{0.06}{12} = 0.005$. $q = \frac{1}{1+p} = \frac{1}{1.005}$. $T = 60$.

$$\begin{aligned} P &= Fq \left[\frac{q^T - 1}{q - 1} \right] \\ &= 16 \left(\frac{1}{1.005} \right) \left[\frac{\left(\frac{1}{1.005} \right)^{60} - 1}{\frac{1}{1.005} - 1} \right] \\ &= \$827.61. \end{aligned}$$

(b) \$868.79.

76. $P = 16,000,000,000$. $p = \frac{0.03}{1} = 0.03$. $q = \frac{1}{1+p} = \frac{1}{1.03}$. $T = 40$.

$$\begin{aligned} P &= Fq \left[\frac{q^T - 1}{q - 1} \right] \\ 16,000,000,000 &= F \left(\frac{1}{1.03} \right) \left[\frac{\left(\frac{1}{1.03} \right)^{40} - 1}{\frac{1}{1.03} - 1} \right] \\ 16,000,000,000 &= F(23.11). \end{aligned}$$

So $F = \$692,198,046$ annual payment.

78. (a) $P = 95,000$. $p = \frac{0.0525}{12} = 0.004375$. $q = \frac{1}{1+p} = \frac{1}{1.004375}$. $T = 15(12) = 180$.

$$\begin{aligned} P &= Fq \left[\frac{q^T - 1}{q - 1} \right] \\ 95,000 &= F \left(\frac{1}{1.004375} \right) \left[\frac{\left(\frac{1}{1.004375} \right)^{180} - 1}{\frac{1}{1.004375} - 1} \right] \\ 95,000 &= F(124.40). \end{aligned}$$

So $F = \$763.68$ is the new payment, and they save $1104 - 763.68 = \$340.32$ each month.

(b) Over the life time of the loan they pay $763.68 \times 180 = \$137,462$. So the interest paid over the life of time of the loan is $137,462 - 95,000 = \$42,462$.

80. $F = 877$. $p = \frac{0.0575}{12} = 0.004792$. $q = \frac{1}{1+p} = \frac{1}{1.004792}$. $T = 30(12) = 360$.

$$\begin{aligned} P &= Fq \left[\frac{q^T - 1}{q - 1} \right] \\ &= 877 \left(\frac{1}{1.004792} \right) \left[\frac{\left(\frac{1}{1.004792} \right)^{360} - 1}{\frac{1}{1.004792} - 1} \right] \\ &= 150,275. \end{aligned}$$

Adding on the down payment of \$35,000, the total cost of the home was \$185,275.