MA111 — Homework #10 Short Solutions

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

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

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.

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

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

\[
P = F q \left[ \frac{q^T-1}{q-1} \right] = 16 \left( \frac{1}{1.005} \right) \left[ \frac{(1.005)^{60}-1}{1.005-1} \right] = \$827.61.
\]

(b) \$868.79.

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

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

So \( F = \$692,198,046 \) annual payment.
78. (a) \( P = 95,000 \). \( p = \frac{0.0525}{12} = 0.004375 \). \( q = \frac{1}{1+p} = \frac{1}{1.004375} \). \( T = 15(12) = 180 \).

\[
P = F q \left[ \frac{q^T - 1}{q - 1} \right]
\]

\[
95,000 = F \left( \frac{1}{1.004375} \right) \left[ \frac{(\frac{1}{1.004375})^{180} - 1}{\frac{1}{1.004375} - 1} \right]
\]

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

\[
P = F q \left[ \frac{q^T - 1}{q - 1} \right]
\]

\[
= 877 \left( \frac{1}{1.004792} \right) \left[ \frac{(\frac{1}{1.004792})^{360} - 1}{\frac{1}{1.004792} - 1} \right]
\]

\[
= 150,275.
\]

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