MA111 — Homework #9 Short Solutions

22. (a) $1250(1 + .051(3)) = \$1441.25$.
    (b) \$1632.50.
    (c) \$2015.00.

24. \$3442.80.

28. $7620 = 6000(1 + 6r)$. Solve for r: $r = 0.045$, so $R = 4.5\%$.

30. For convenience, let's triple \$1 to \$3. $3 = 1(1 + 20r)$. Solve for r: $r = 0.1$, so $R = 10\%$.

32. (a) $1237.50(1 + 0.0825)^3 = \$1569.74$.
    (b) No additional growth occurs in the final half year, so just calculate with 4 years. \$1699.25.

34. In the first 4 years the money grows to \$3082.41. In the next 3 years this new value grows to \$3542.85.

36. In the first 3 years the money grows to \$2925.18. Remove \$850, leaving \$2075.18. In the next 5 years this new value grows to \$2696.15.

38. (a) $874.83(1 + \frac{0.0775}{365})^{365(2)} = \$1021.49$.
    (b) To find the APY, just find out the percent growth of \$1 in one year. \$1 grows to $1(1+\frac{0.0775}{365})^{365} = \$1.080573$. So the percent growth in one year is $\frac{1.080573-1}{1} \times 100 = 8.0573\%$.

40. (a) Remember that there are $365 \times 24 \times 60 = 525600$ minutes in a year. \$1451.68.
    (b) Check how \$1 grows in one year and calculate the percent growth. 6.9830%.

42. Check how \$1 would grow in one year. In the first case it would grow to \$1.09, which is a growth rate of 9%. In the second case it would grow to \$1.091096, which is a growth rate of 9.1096%. In the third case (this formula is on page 375) it would grow to $F = Pe^{rt} = 1e^{0.0875} = \$1.089806$, which is a growth rate of 8.9806%.

48. (a) We want $1080 \leq 540(1 + .0675)^t$, so $2 \leq (1.0675)^t$. Find t by guess and check to see $t = 11$.
    (b) We want $2P \leq P(1 + .0675)^t$, so $2 \leq (1.0675)^t$. So we get the same value of t.

50. $732.05 = P(1 + .10)^3$. Solve for P: $P = \$550$.

52. (a) $G_1 = cP = 800.$

(b) $G_5 = c^5 P = 327.68.$

(c) $G_N = (0.8)^N (1000).$

54. (a) $c = \frac{G_1}{G_0} = 1.5.$

(b) $G_5 = c^5 P = 60.75.$

(c) $G_N = (1.5)^N (8).$

58. (a) $c = \frac{G_1}{G_0} = 4.$ $G_{20} = c^{20} P = 4^{20}(2.5) = 2.75 \times 10^{12}.$

(b) $G_N = 4^N (2.5).$

(c) $2.5 + (4)(2.5) + (4)^2(2.5) + \cdots + (4)^{20}(2.5) = 2.5\frac{4^{21}-1}{4-1} = 3.67 \times 10^{12}.$

60.

$$\begin{aligned} & 500(1.075) + 500(1.075)^2 + 500(1.075)^3 + \cdots + 500(1.075)^{60} \\ = \; & 500(1.075)\left[1 + 1.075 + (1.075)^2 + \cdots + (1.075)^{59}\right] \\ = \; & 500(1.075) \cdot 1 \left(\tfrac{(1.075)^{60}-1}{1.075-1}\right) \\ = \; & \$542,152.89. \end{aligned}$$

To evaluate the expression in the above square brackets, we used $P = 1$ and $c = 1.075$.

62.

$$\begin{aligned} & \tfrac{500}{1.075} + \tfrac{500}{(1.075)^2} + \tfrac{500}{(1.075)^3} + \cdots + \tfrac{500}{(1.075)^{60}} \\ = \; & \tfrac{500}{1.075}\left[1 + \tfrac{1}{1.075} + \tfrac{1}{(1.075)^2} + \cdots + \tfrac{1}{(1.075)^{59}}\right] \\ = \; & \tfrac{500}{1.075} \cdot 1 \left(\frac{\left(\frac{1}{1.075}\right)^{60}-1}{\frac{1}{1.075}-1}\right) \\ = \; & \$6579.69. \end{aligned}$$

To evaluate the expression in the above square brackets, we used $P = 1$ and $c = \frac{1}{1.075}$.