

$$1.1.7 \quad (a) \quad 1000 = 850 \left[1 + i \left(\frac{60}{365} \right) \right] \rightarrow i = 1.0735 (107.35\%)$$

$$(b) \quad 1000 = 900 \left[1 + i \left(\frac{60}{365} \right) \right] \rightarrow i = .6759 (67.59\%)$$

$$(c) \quad 900 \left[1 + (.09) \left(\frac{60}{365} \right) \right] = 913.32$$

$$(d) \quad 900 \left[1 + (.09) \left(\frac{d}{365} \right) \right] = 1000 \rightarrow d = 451$$

- 1.1.8 It is to Smith's advantage to take the loan of 975 on the 7th day if the amount payable on the 30th day is less than the amount due to the supplier:

$$975 \left[1 + i \left(\frac{23}{365} \right) \right] \leq 1000 \rightarrow i \leq .4069.$$

- 1.1.9 (a) Maturity value of 180-day certificate is

$$100,000 \left(1 + .075 \left(\frac{180}{365} \right) \right) = 103,698.63.$$

Interim book value after 120 days is

$$100,000 \left(1 + .075 \left(\frac{120}{365} \right) \right) = 102,465.75.$$

Bank will pay X after 120 days so that

$$X \left(1 + .09 \left(\frac{60}{365} \right) \right) = 103,698.63 \rightarrow X = 102,186.82.$$

The penalty charged is $102,465.75 - 102,186.82 = 278.93$.

$$(b) \quad 1.08 = \left(1 + \frac{.075}{2} \right) \left(1 + \frac{i}{2} \right) \rightarrow i = .0819$$

$$1.1.10 \quad (a) \quad 1000(1.12)^t = 3000 \rightarrow t = \frac{\ln(3)}{\ln(1.12)} = 9.694 \text{ (9 years and approximately 253 days).}$$

- (b) At the end of 9 years the accumulated value is $1000(1.12)^9 = 2773.08$. At time s during the 10th year, the accumulated value based on simple interest within the 10th year is $2773.08(1 + .12s)$. Setting this equal to 3000 and

$$\text{solving for } s \text{ results in } s = \frac{\left(\frac{3000}{2773.08} \right) - 1}{.12} = .6819 \text{ years}$$

(approximately 249 days) after the end of 9 years.

$$(c) \quad 1000(1.01)^t = 3000 \rightarrow t = \frac{\ln(3)}{\ln(1.01)} = 110.41 \text{ months (about 9 years and 2 months and 13 days).}$$

$$(d) \quad 1000(1+i)^{10} = 3000 \rightarrow i = 3^{1/10} - 1 = .1161 \text{ (11.61\% per year).}$$

$$(e) \quad 1000(1+j)^{120} = 3000 \rightarrow i = 3^{1/120} - 1 = .009197 \text{ (.9197\% per month).}$$

$$1.1.11 \quad (a) \quad (1.0075)^{67/17} = 1.0299 < 1.03$$

(but $(1.0075)^{68/17} = (1.0075)^4 = 1.0303$)

$$(b) \quad (1.015)^{67/17} = 1.0604 > 1.06$$

$$1.1.12 \quad (a) \quad \text{Smith buys } \frac{910}{4} = 227.5 \text{ units after the front-end load is paid.}$$

Six months later she receives $(227.5)(5)(.985) = 1120.4375$.
Smith's 6-month rate of return is 12.04% on her initial 1000.

(b) If unit value had dropped to 3.50, she receives $(227.5)(3.5)(.985) = 784.30625$, which is a 6-month effective rate of -21.57%.