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

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

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

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

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

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

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

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

Interim book value after 120 days is

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

Bank will pay X after 120 days so that

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

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

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

1.1.10 (a) $1000(1.12)^t = 3000 \rightarrow t = \frac{\ln(3)}{\ln(1.12)} = 9.694$ (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 10^{th} year, the accumulated value based on simple interest within the 10^{th} year is $2773.08(1+.12s)$. Setting this equal to 3000 and solving for s results in $s = \frac{\left(\frac{3000}{2773.08}\right)-1}{.12} = .6819$ years (approximately 249 days) after the end of 9 years.

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

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

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

1.1.11 (a) $(1.0075)^{67/17} = 1.0299 < 1.03$
$\left(\text{but } (1.0075)^{68/17} = (1.0075)^4 = 1.0303\right)$

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

1.1.12 (a) Smith buys $\frac{910}{4} = 227.5$ 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%.