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Office hour: 3:30 ~ 4:30 pm Monday  
HH 401

Preliminary:

Compound Interest:  $A(t) = A(0)(1+i)^t$

Simple Interest:  $A(t) = A(0)(1+it)$

Present value:  $A(0) = A(t)v^t$ .  $v = \frac{1}{1+i}$  is present value factor.

Treasury Bills:  $\text{price} = \frac{\text{face amount}}{1+it}$

1.1.2.

how to measure.  
(a)  $A(0) = 2500$ ,  $t = \frac{10}{1} = 10$ ,  $i = 4\%$

$$A(t) = A(0)(1+i)^t = 2500 \times (1+4\% \times 10) = 3500.$$

(b)  $A(t) = A(0)(1+i)^t = 2500 \times (1+4\%)^{10} = 3700.61$

(c)  $A(0) = 2500$ ,  $t = \frac{10}{0.5}$ ,  $i = 2\%$

$$A(t) = A(0)(1+i)^t = 2500 \times (1+2\%)^{\frac{10}{0.5}} = 3714.87$$

(d)  $t = \frac{10}{0.25}$ ,  $i = 1\%$

$$A(t) = A(0)(1+i)^t = 2500 \times (1+1\%)^{\frac{10}{0.25}} = 3722.16$$

1.1.10.

(a)  $A(0) = 1000$ ,  $A(t) = 3000$ ,  $i = 12\%$

$$(1+i)^t = \frac{A(t)}{A(0)} \Rightarrow t \log(1+i) = \log A(t) - \log A(0) \Rightarrow t = \frac{\log A(t) - \log A(0)}{\log(1+i)} = 9.694$$

(b) Integer part: 9.

fractional part: 0.6819

$$A(t) (1+i)^{2t} (1+iS)^{-2t} = 1000 (1+12\%)^9 (1+12\% \times S) = 3000 \Rightarrow S = 0.6819$$

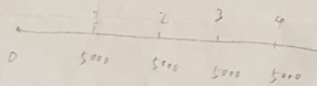
$$t = 9 + 0.6819 = 9.6819$$

(c)  $i$ 's monthly  $i = 1\%$ ,  $1000(1+0.01)^t = 3000 \Rightarrow t = 110.41$  months.

$$(d) (1+i)^t = \frac{A(t)}{A(0)} \Rightarrow i = \sqrt[t]{\left(\frac{A(t)}{A(0)}\right)} - 1 = \sqrt[10]{\frac{3000}{1000}} - 1 = 0.1161$$

$$(e) j = \sqrt[t]{\frac{A(t)}{A(0)}} - 1 = \sqrt[120]{\frac{A(t)}{A(0)}} - 1 = 0.009197$$

1.2.1.



$$v = \frac{1}{1+i} = \frac{1}{1+6\%}$$

$$\text{present value} = 5000v + 5000v^2 + 5000v^3 + 5000v^4 = 17,325.53$$

1.2.4.

$$v_{6\%} = \frac{1}{1+6\%}, \quad v_{7\%} = \frac{1}{1+7\%}, \quad v_{9\%} = \frac{1}{1+9\%}$$

$$PV = 1000 v_{6\%}^2 + v_{7\%}^4 + v_{9\%}^3 = 494.62$$

1.2.15.

$$(a) t = \frac{187}{365}, \quad P = \frac{\text{face amount}}{1+it} = \frac{100,000}{1+10\% \times \frac{187}{365}} = 93,250.52$$

$$(b) P = \frac{F}{1+it}, \quad \frac{dP}{di} = -\frac{F}{(1+i)^2} \cdot t, \quad \frac{dP}{di} = \frac{P(1+i) - P(i)}{i} = \frac{\Delta P}{\Delta i}, \quad \Delta i = 10.1\% - 10\%$$
$$\Rightarrow \Delta P = \frac{dP}{di} \cdot \Delta i = -23733.34$$

$$(c) t = \frac{91}{365}, \quad \text{when } t=0, \quad \frac{dP}{di} = -\frac{F}{(1+i)^2} \cdot t = 0$$