PSTAT 171 HW 5

3.7) 8) a) $1000\left(1-\frac{1}{(1.04)^{29}}\right)/.04 + 1000$

$= 17983.71$

$2000\left(1-\frac{1}{1.04^{29}}\right)/.04 + 1000$

$= 35967.43$

$\frac{1500\left(1-\frac{1}{1.04^{29}}\right)}{.04} + 1500$

$= 26957.57$

$\frac{3000\left(1-\frac{1}{(1.04)^{29}}\right)}{.04} + 3000$

$= 53951.14$

$17983.71 + \frac{35967.43}{(1.04)^{3/12}}$

$+ \frac{26975.57}{(1.04)^{6/12}} + \frac{53951.14}{(1.04)^{9/12}}$

$= 132439.18$

b)

3.8) 4) $1000(1.03^{30}-1)/.03$

$= 47575.42$

$[1000(.06)/.03 - .96^{2}]$

$[1.03(.96^{2})\sum(1.03)(.96)^{i} - (.96^{2}\sum .96^{i})^{2}]$

$= 60/(.03 + .96^{30-2})[1.03[1-(1.03 \cdot .96)^{29}/$

$1-[1.03 \cdot .96]] - [1-.96^{29}/.04]$

$= 51926.31$

$47575.42 + 51926.31 = \underline{99501.73}$

3.9) 1) a) $D_{s_{\overline{28|}}} = \frac{28(1+.03)^{28} - \frac{(1.03)^{28}-1}{.03}}{.03}$

$= \underline{704.37}$

b) $I\ddot{a}_{\overline{\infty|}} = 1 + \frac{2}{i} + \frac{1}{i^{2}}$

$= 1 + \frac{2}{.03} + \frac{1}{(.03)^{2}} = \underline{1178.78}$

c) $I_{100,10}a_{\overline{15|}}$

$= 100\left(\frac{1-(1.03)^{-15}}{.03}\right) + 10\left(\frac{\frac{1-1.03^{-15}}{i} - 15(1.03)^{-15}}{.03}\right)$

$= \underline{1963.80}$

3.9) 2) $100000 - (5000 \times 10) = 50000$

$$50000 = 5000\,i\left[\begin{array}{l} 1.1^{9}\times 1 + 1.1^{8}\times 2 + 1.1^{7}\times 3 + \\ 1.1^{6}\times 4 + 1.1^{5}\times 5 + 1.1^{4}\times 6 \\ + 1.1^{3}\times 7 + 1.1^{2}\times 8 + 1.1^{1}\times 9 \\ + 1.1^{0}\times 10 \end{array}\right]$$

$10 = 75.3116\,i \qquad i = 10/75.3116$

$= \underline{13.278\ \%}$

3.10) 7) $5000 \times (1.05)^5 = 6381.41$

$5000 \times (1.05)^4 = 6077.53$

$5000 \times (1.05)^3 = 5788.13$

$5000 \times (1.05)^2 = 5512.50$

$5000(1.05)^1 = 5250.00$

$6381.41 + 6077.53 + 5788.13 +$

$5512.50 + 5250.00$

$= 29009.56$

$$\frac{7000}{(1+r)} + \frac{7000}{(1+r)^2} + \frac{7000}{(1+r)^3}$$

$$+ \frac{7000}{(1+r)^4} + \frac{7000}{(1+r)^5}$$

$+ \; 29009.56 / (1+r)^6 = 80000$

solving for r, $\underline{\underline{r = -4.89686\%}}$

3.12) 2)

$$i_k \begin{cases} .3 & k=1 \\ .4 & k=2 \\ .5 & k=3 \\ .6 & k=4 \\ .7 & k=5 \end{cases}$$

$A_1 = P_o(1.03) = 1.03 P_o$

$A_2 = 1.03 P_o (1.04) = 1.0712 P_o$

$A_3 = 1.0712 P_o (1.05) = 1.12476 P_o$

$A_4 = 1.12476 P_o (1.06) = 1.19225 P_o$

$A_5 = 1.19225 P_o (1.07) = 1.2757 P_o$

$(A_1 + A_2 + A_3 + A_4 + A_5) - (A_1 + A_2 + A_3 + A_4)$

$A_{\overline{5}|} = 4.41618 \quad S_{\overline{5}|} = 5.63367$

$\frac{S_{\overline{5}|}}{A_{\overline{5}|}} = a(\tau) \Rightarrow T = 5$

5.4) 2) $P_n = C_n + I_n = 2I_n = 2iD_n$

$D_n = D_{n-1} - C_n = D_{n-1} - iD_{n-1}$

$D_n = D_0(1-i)^n = L(1-i)^n$

$P_n = P_1(1-i)(n-1) = 2iL(1-i)(n-1)$

$L(2i(1-i)(n-1) + (1-i)^n$

$(1-i)^n \quad ((F(1-i))/1(1+i))$

$\Rightarrow 23.73$

$n = 24$

$P_{24} + D_{24} = 275.45 + 1482.57$

$= 1758.02$

4.0) 2) This can be solved for using $i^* = \frac{1-g}{1+g}$, multiplying the payment value and divide by the geometrically increased $(g)+1$ to get $\frac{x}{1+g} a_{\overline{n}|i^*}$

$4{,}76930 =$

4.2) 5) $\frac{A}{R}\left[1-(1+R)^{-N}\right](1+R)$

$= \frac{1000}{R}\left[1-(1+r)^{-72}\right](1+R)$

$= \frac{1000}{R}\left[1-(1+.036575)^{-72}\right](1+R)$

$= \frac{919.71\,(1+R)}{R}$

$= (1+R)/R = \frac{4769.30}{919.71}$

$\Rightarrow 5.19$

$R = \frac{1}{5.19-1} = .2389$

$1.2389 = (1+r)^{k}$

$r = .036575$

$k = \frac{\ln(1.2389)}{\ln(1.036575)}$

$\Rightarrow k = 6$

4.2) 6) @ $t = 0$, $i_0 = \frac{i}{4}$

$V_t = \frac{1}{(1+i_0)^1} + \frac{1}{(1+i_0)^i} + \frac{1}{(1+i_0)^{4m}}$

$= \frac{1}{1+i_0}\left[\frac{1-\frac{1}{1+i_0}^{4m}}{1-\frac{1}{1+i_0}}\right] \Rightarrow \frac{1}{1+i_0}\left[1-\frac{1}{(1+i_0)^{4m}}\right]\left(\frac{1+i_0}{i_0}\right)$

$V_t = \frac{1}{i^4}\left(1-\left(1+\frac{i}{4}\right)^{-4m}\right) = \frac{Cn/4}{1+i^4/4} + \frac{Cn/4}{(1+i^4/4)^i} + \cdots$

$V_t = \frac{Cn}{4}\left[\frac{1-\left(1-\frac{i^4}{4}\right)^{-4m}}{i^4/4}\right] + \frac{n}{(1+i^4/4)^{4m}}$