Math 107 – Prof. Richard B. Goldstein – Chap 3 HW – Barnett (2nd Ed)

Sect 3.1

#5 $0.42\% = \boxed{0.0042}$; $120 \text{ days} = \boxed{\frac{1}{3}\text{ year}}$

#9 $P = \$300$, $r = 7\%$, $t = 2$ yrs $I = Prt = 300\,(0.07)\,2 = \boxed{\$42}$

#15 $I = \$60$, $P = \$2400$, $r = 5\%$ $I = Prt$ $60 = 2400(0.05)\,t$

$t = \frac{60}{2400(0.05)} = \frac{60}{120} = \boxed{0.5 \text{ yr}}$ (6 mos.)

#23 $A = \$736$ $P = \$640$ $r = 15\%$ $t = ?$ $1 + 0.15t = \frac{736}{640} = 1.15$

$A = P(1+rt)$ $736 = 640(1+0.15t) \Rightarrow$ $0.15t = 0.15$ $\boxed{t=1}$

#37 loan \$7260 repaid in 8 mos $(t = \frac{2}{3})$ $r = 8\%$

$A = P(1+rt) = 7260\left(1 + \frac{2}{3}(0.08)\right) = 7260(1.0533\ldots) = \boxed{\$7{,}647.20}$

#45 $t = 13$ wk T-bill $= 0.25$ yr, maturity value $= \$1{,}000$, sells for \$989.37

$1000 = 989.37(1 + i(0.25)) \Rightarrow 1 + 0.25i = 1.010744\ldots$

$i = 0.04298 \Rightarrow \boxed{4.30\%}$

Sect 3.2

#1 $A = P(1+i)^n = 100\,(1.01)^{12} = \boxed{\$112.68}$

#5 $A = \$10{,}000$ $i = 0.03$ $n = 48$ $P = \frac{A}{(1+i)^n} = \frac{10000}{(1.03)^{48}} = \boxed{\$2{,}419.99}$

#13 $A = \$88{,}000$ $P = \$71{,}153$ $r = 8.5\%$ $t = ?$ $A = Pe^{rt}$

continuous compounding

$88000 = 71153\, e^{0.085t}$

$e^{0.085t} = 1.23677\ldots$ $0.085t = 0.2125\ldots$ $\boxed{t = 2.5}$

#29 0.018% per day $(1+0.00018)^{360} - 1 = 0.06694$ $\boxed{6.694\%}$ effective annual yield

$.00018(365) = 0.0657$ $\boxed{6.57\%}$

#33 (A) $100(1.06)^4 = \$126.25$ \$26.25 in interest

(B) $100\left(1 + \frac{0.06}{4}\right)^{16} = 126.90$ 26.90 " "

(C) $100\left(1 + \frac{0.06}{12}\right)^{48} = 127.05$ 27.05 " "

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Sect 3.2

#45 (A) $A = Pe^{rt}$ $\quad P = Ae^{-rt} = 25000\,e^{-0,09(3)} = \boxed{\$19,084.49}$

(B) $= 25000\,e^{-0,09(4)} = \boxed{\$11,121.45}$

#77 $A = P\left(1+\frac{r}{n}\right)^{nt} = 20000\left(1+\frac{0.06}{365}\right)^{\overset{12,775}{365(35)}} = 20000(8,16476\ldots) = \boxed{\$163,295.21}$

Sect 3.3

#11 $n=40$ $\quad i=0.02$ $\quad PMT = \$1000$ $\quad FV = PMT\,\frac{(1+i)^n-1}{i} = 1000\,\frac{(1.02)^{40}-1}{0.02} = 1000(60.40198)$

$\boxed{\$69401,98}$

#15 $FV=5000$ $\quad n=15$ $\quad i=0.01$ $\quad PMT=?$ $\quad \frac{FV}{\left[\frac{(1+i)^n-1}{i}\right]} = \frac{5000}{\frac{(1.01)^{15}-1}{0.01}} = \frac{5000}{16.0968\ldots} = \boxed{\$310.62}$

#19 $FV=7600$ $\quad PMT=500$ $\quad n=10$ $\quad i=?$ $\quad 7600 = 500\left[\frac{(1+i)^{10}-1}{i}\right]$

One can use trial + error, Derive, Excel etc.

ex. $i=0.05$ $\quad FV=6289$
$i=0.10$ $\quad FV=7968$ $\Rightarrow$ try $i=0.08$ $\quad FV=7243$ etc

$i = 0.090097 \Rightarrow \boxed{9.01\%}$

#33 Bob 24: \$1000
35: 1000 } n=12 6.4%

$1000\,\frac{(1+0.064)^{12}-1}{0.064} = \$17,269.22$ at age 35

30 yrs later: 65 $\quad 17,269.22\,(1.064)^{30} = \boxed{\$111,050.75}$

↑ #21 6.65% compounded mo.
PMT: \$500 $\quad$ 10 yrs = 120 mos.

$500\left[\frac{\left(1+\frac{0.0665}{12}\right)^{120}-1}{\frac{0.0665}{12}}\right] = 500(169.79\ldots)$

$\boxed{\$84,895.40}$

interest $84895.40 - 500(120) = \boxed{\$24,895.40}$

Sect 3.4

#11 $n=25$ $i=0.025$ $PMT=250$ $PV=?$

$$PV = PMT\left[\frac{1-(1+i)^{-n}}{i}\right] = 250\left[\frac{1-(1.025)^{-25}}{0.025}\right] = 250(18.424\ldots) = \boxed{\$4606.09}$$

#15 $PV=40000$ $n=96$ $i=0.0075$ $PMT=?$

$$PMT = PV\left[\frac{i}{1-(1+i)^{-n}}\right] = 40000\left[\frac{0.0075}{1-1.0075^{-96}}\right] = 40000(0.01465\ldots) = \boxed{\$586.01}$$

#19 $PV=9000$ $PMT=600$ $n=20$ $i=?$

$$9000 = 600\left[\frac{1-(1+i)^{-20}}{i}\right] \Rightarrow i = 0.029115 \ldots \quad \boxed{2.91\%}$$

by Excel

#25 $PV=\$2500$ $n=48$ $i=1.25\%$

$$PMT = 2500\left[\frac{0.0125}{1-1.0125^{-48}}\right] = \boxed{\$64.58}$$

interest $64.58(48) - 2500 = \boxed{\$839.84}$

#29 \$27,300 0% financing $\Rightarrow \frac{27300}{60} = \boxed{\$455/\text{mo}}$ total 27,300

with rebate \$5000 $PV = 27300-5000 = \$22,300$ $i = 0.063/12 = 0.00525$

$$PMT = 22,300\left[\frac{0.00525}{1-1.00525^{-60}}\right] = \boxed{434.24} \leftarrow$$ lower monthly payment

$434.24(60) = \$26,054.40$ (less)

* take loan from local bank

#45 7.5% comp. mo
$PV = \$500,000$

$$PMT = \overset{500000}{\downarrow}PV\left[\frac{0.00625}{1-1.00625^{-n}}\right] = \frac{3125}{1-1.00625^{-n}}$$

(A) $PMT = \$5000 = \frac{3125}{1-1.00625^{-n}} \Rightarrow 1-1.00625^{-n} = \frac{3125}{5000} = 0.625$

$1.00625^{-n} = 0.375$ $\quad -n \ln 1.00625 = \ln 0.375$

$n = \frac{-\ln 0.375}{\ln 1.00625} = \boxed{157.4}$

(B) 4000 $\quad 1.00625^{-n} = 1 - \frac{3125}{4000} = 0.21875 \quad n = \frac{-\ln 0.21875}{\ln 1.00625} = \boxed{243.9}$ over 20 yrs

(C) $500000(0.00625) = 3125 > 3000 \quad \therefore \boxed{n \Rightarrow \infty}$ forever