Interest

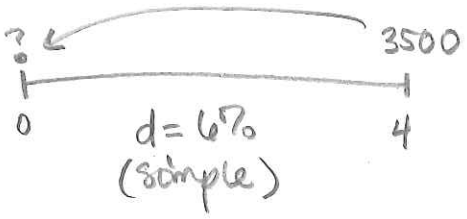
1) $A(t) = k(1+it) = k + \underbrace{kit}_{\text{Interest earned}}$

$A(5) = 1500 + 1500(0.035)(5)$

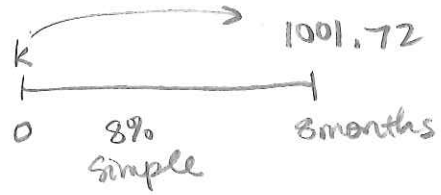
$= 1500 + 262.50$

$A(5) = \$1762.50$ (accumulated amt)

Interest earned $= \$262.50$

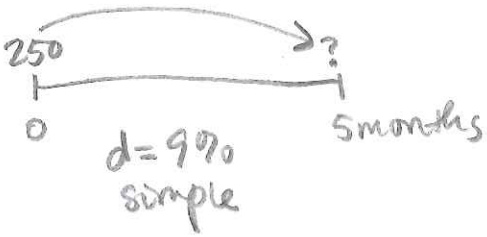
2) 

$3500(1 - 0.06 \cdot 4) = \$2660$

3) 

$k(1 + 0.08(\frac{8}{12})) = 1001.72$

$k = \$951$

4) 

$250(1 - 0.09 \cdot \frac{5}{12})^{-1} = \$259.74$

5) Goal: Find $i^{(12)}$ given $d^{(2)} = 6.8\%$

$$\left(1+\frac{i^{(12)}}{12}\right)^{12} = \left(1-\frac{d^{(2)}}{2}\right)^{-2}$$

$$1+\frac{i^{(12)}}{12} = \left[\left(1-\frac{0.068}{2}\right)^{-2}\right]^{\frac{1}{12}}$$

$$i^{(12)} = 12\left[(0.966)^{-\frac{2}{12}} - 1\right]$$

$$i^{(12)} = 0.0693827\,01 \quad \text{or} \quad \boxed{i^{(12)} \approx 6.9383\%}$$

6) Goal: Find d given $i^{(4)} = 12\%$.

$$(1-d)^{-1} = \left(1+\frac{i^{(4)}}{4}\right)^{4}$$

$$1-d = \left(1+\frac{0.12}{4}\right)^{-4}$$

$$d = 1-(1.03)^{-4}$$

$$d = 0.1115\,12952 \quad \text{or} \quad \boxed{d \approx 11.1513\%}$$

7) 

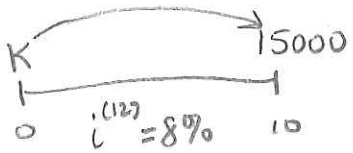
a) $K = 10000v^{15}$ where $v = \frac{1}{1.04}$

$$\boxed{K = \$5,552.65}$$

b) $K = 10000(1-0.04)^{15}$

$$\boxed{K = \$5,420.86}$$

8) $10000\left(1+\frac{0.05}{2}\right)^{2(6)} = \boxed{\$13,448.89}$

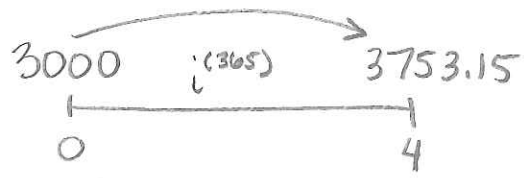
9) 

$$K\left(1+\frac{0.08}{12}\right)^{12\cdot 10} = 15000$$

$$K = \frac{15000}{\left(1+\frac{0.08}{12}\right)^{120}}$$

$$\boxed{K = \$6757.85}$$

10)



$$3000\left(1+\frac{i^{(365)}}{365}\right)^{365\cdot 4} = 3753.15$$

$$\left(1+\frac{i^{(365)}}{365}\right)^{1460} = 1.25105$$

$$1+\frac{i^{(365)}}{365} = (1.25105)^{\frac{1}{1460}}$$

$$i^{(365)} = 365\left[(1.25105)^{\frac{1}{1460}} - 1\right]$$

$$i^{(365)} = 0.056000095 \quad \text{or} \quad \boxed{5.6000\%}$$

11) $3753.15(1-d)^4 = 3000$

$$1-d = \left(\frac{3000}{3753.15}\right)^{\frac{1}{4}}$$

$$d = 1-\left(\frac{3000}{3753.15}\right)^{\frac{1}{4}}$$

$$d = 0.054456893$$

or

$$\boxed{d \approx 5.4457\%}$$

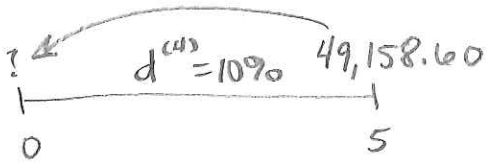
12) $6000\left(1+\frac{i^{(4)}}{4}\right)^{4.5} = 7000$

$$1+\frac{i^{(4)}}{4} = \left(\frac{7}{6}\right)^{\frac{1}{20}}$$

$$i^{(4)} = 4\left[\left(\frac{7}{6}\right)^{\frac{1}{20}} - 1\right]$$

$i^{(4)} = 0.030949254$ or $\boxed{i^{(4)} = 3.09490\%}$

13)



$$K = 49158.60\left(1-\frac{0.10}{4}\right)^{4.5}$$

$\boxed{K = \$29,627.28}$

14) $2500(1+0.07)^5 + 0.02(2500) = 2500(1+i)^5$

$$3556.38 = 2500(1+i)^5$$

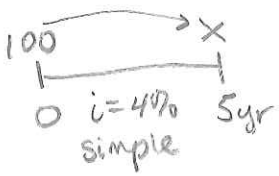
$$(1.42255)^{\frac{1}{5}} - 1 = i$$

$$i = 0.073034322$$

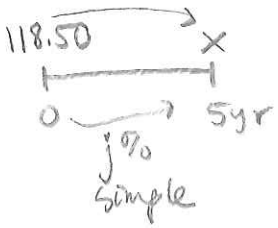
or $\boxed{7.30349\%}$

15)

Fund P



Fund Q



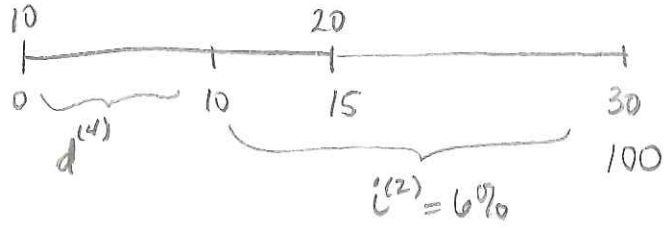
$$100(1+0.04\cdot 5) = 118.50\left(1+\frac{j}{100}\cdot 5\right)$$

$$120 = 118.50\left(1+\frac{j}{20}\right)$$

$$20\left(\frac{120}{118.50}-1\right) = j$$

$$\boxed{j\% = 0.2532\%}$$

16)



$$10\left(1-\frac{d^{(4)}}{4}\right)^{-4\cdot 10}\left(1+\frac{0.06}{2}\right)^{2\cdot 20} + 20\left(1+\frac{0.06}{2}\right)^{2\cdot 15} = 100$$

$$32.6204\left(1-\frac{d^{(4)}}{4}\right)^{-40} + 48.5452 = 100$$

$$\left(1-\frac{d^{(4)}}{4}\right)^{-40} = 1.5774$$

$$0.01133 = \frac{d^{(4)}}{4}$$

$$d^{(4)} = 0.045317892$$

or $\boxed{4.5318\%}$

17) $1+i = e^{\delta}$

$i = e^{0.05} - 1$

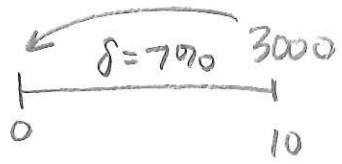
$i = 0.051271096$

$\boxed{i = 5.1271\%}$

18) 

$1000e^{-0.08}e^{-0.07}e^{-0.05}e^{-0.04}e^{-0.06} = 1000e^{-0.3}$

$= \boxed{\$740.82}$

19) 

$3000e^{-0.07 \cdot 10} = \boxed{\$1489.76}$

20) $A(t_2) = A(t_1)e^{\int_{t_1}^{t_2} \delta_r dr}$

$A(6) = A(4)e^{\int_4^6 (0.3 - 0.05t)dt}$

$= 500e^{(0.3t - 0.025t^2)\Big|_4^6}$

$= 500e^{0.9 - 0.8}$

$= 500e^{0.1}$

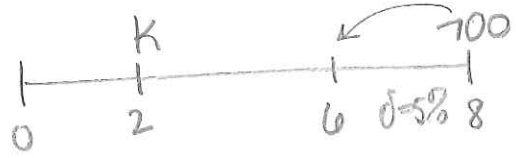
Now accumulate 4 yrs w/ $\delta = 5\%$

$500e^{0.1}e^{0.05 \cdot 4} = 500e^{0.1}e^{0.2}$

$= 500e^{0.3}$

$= \boxed{\$674.93}$

21)



$$A(6) = \underbrace{A(2)}\, e^{\int_2^6 (0.3 - 0.05t)\,dt} = 700\, e^{-0.05 \cdot 2}$$

$$\downarrow \quad (0.3t - 0.025t^2)\Big|_2^6$$

$$K e = 700\, e^{-0.1}$$

$$K e^{0.9 - 0.5} = 700 e^{-0.1}$$

$$K = \frac{700 e^{-0.1}}{e^{0.4}} = 700 e^{-0.5}$$

$$\boxed{K = \$424.57}$$

22)

95

$$95 = 50 + 58v$$

$$\frac{45}{58} = v$$

$$\frac{58}{45} = 1 + i$$

$$i = \frac{58}{45} - 1 = \frac{13}{45}$$

$$\boxed{i \approx 28.8889\%}$$

23) $1 + i' = \frac{1+i}{1+r}$ where i = annual effective rate of interest

i' = real rate of return

r = inflation rate

$$1+i' = \frac{1+0.04}{1+0.015}$$

$$i' = 0.024630542$$

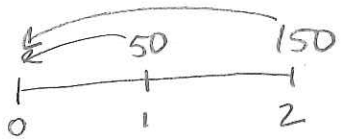
$$\boxed{i' = 2.463107\%}$$

24) $1 + i' = \frac{1+i}{1+r}$

$$1 + 0.07 = \frac{1+i}{1+0.03}$$

$$(1.07)(1.03) = 1+i$$

$$1.1021 = 1+i$$



$$50v + 150v^2 = \frac{50}{1.1021} + \frac{150}{(1.1021)^2}$$

$$= \boxed{\$168.86}$$