1) $d^{(4)} = 8\%$

Quarterly Rate of discount $= \frac{d^{(4)}}{4} = 2\%$

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

$$i = 8.4165\%$$

i) $\delta = \ln(1+i)$

$= 8.081\%$

ii) $i = 8.4165\%$

iii) $d^{(12)} = 12\left(1 - (1 - 0.0776)^{1/12}\right)$

$= 8.0538\%$

2) $\delta(t) = 0.004t + 0.0002t^2$

i) $PV = 1000\ e^{-\int_0^{10} 0.004t + 0.0002t^2}$

$= 1000\ e^{-[0.2 + 0.0667]}$

$= 765.92$

ii) $(1+i)^{10} = e^{0.2667}$

$(1+i) = \sqrt[10]{1.305648}$

$i = 2.7028\%$

3) i) $d = i \times \frac{1}{1+i}$ $\left[v = \frac{1}{1+i}\right]$

$\boxed{d = iv}$

ii) $d = 1 - (1 - 2.25\%)^4$

$d = 0.087 = 8.7\%$

$d^{(2)} = 2\left(1 - (1 - 8.7\%)^{1/2}\right)$

$= 8.8979\%$.

b) $d^{0.5} = 5\%$ $\left(1 - \frac{d^2}{2}\right)^2 = \left(1 - \frac{d^{-5}}{0.5}\right)^{0.5}$

$d^2 = 5.19925\%$

4) i) $i = 0.08$ $1.08 = \left(1 - \frac{d^{12}}{12}\right)^{-12}$

$d^{12} = 7.6714\%$.

b) $1.08 = \left(1 + \frac{i^{365}}{365}\right)^{365}$

$i^{365} = 7.6969\%$

c) $1.08 = e^{\delta}$ = $\delta = \ln(1+i) = 7.6961\%$.

d) $i^{(0.5)} = 0.5\left((1+0.08)^{1/0.5} - 1\right]$

$= 8.32\%$

5 i) a) $d^{(4)} = 6\%$.

$d = 1 - \left(1 - \frac{6\%}{4}\right)^4$

$d = 5.866\%$

$$i = (1-d)^{-1} - 1$$

$$i = 6.2319\%$$

$$i^{(2)} = 2\left[(1+6.2319\%)^{1/2} - 1\right]$$

$$= 6.1377\%$$

(b) $$d^{(12)} = 12\left[1-(1-0.05866)^{1/12}\right]$$

$$= 6.02988\%$$

7) $PV = 20000$ $AV = 26000$

$n = 17$ months $= 1$ year 5 month

$= 17/12$ yr

$$26000 = 20000(1+i)^{17/12}$$

$$i = 20.345\%$$

$$i^{(4)} = 4\left[(1+i)^{1/4} - 1\right]$$

i) $i^{(4)} = 18.955\%$

ii) $$26000 = 20000\left(1-\frac{d^2}{2}\right)^{-17/12 \times 2}$$

$$d^2 = 17.6882\%$$

iii) $$26000 = 20000\left(1+\frac{17}{12}i\right) \quad i = 21.176\%$$

9) ii) $i^2 = 0.0775$ $$1+i = \left(1+\frac{i^2}{2}\right)^2$$

$$i = 7.9001\%$$

$e^\delta = 1+i$ $\delta = \ln(1.079001) =$

$= 7.60367\%$

$d = 0.073216$

$d^{(12)} = 12\left[1 - (1-d)^{1/12}\right]$

$= 12\left[1 - (1 - 0.073216)^{1/12}\right)$

$= 7.5795\%$

$i^{(1/2)} = 1/2\left((1 + 7.9001\%)^2 - 1\right)$

$= 8.2121\%$

10) $v(t) = e^{-\int_0^5 0.08\,dt + \int_5^{10} 0.06\,dt + \int_{10}^{t} 0.04\,dt}$

$= e^{-(0.7 + 0.04(t-10))}$

$= e^{-(0.7 + 0.04t - 0.4)}$

$= e^{-(0.3 + 0.04t)}$

$v(t) = .7408\ e^{-0.04t}$

11) b) i) $d = 0.05823$

$d^{12} = 12\left(1 - (1 - 0.05823)^{1/12}\right)$

$= 5.9844\%$

ii) $d^{(4)} = 6\%$

$d = \left(1 - \left(1 - \frac{6\%}{4}\right)^4\right.$

$= 5.866\%$

13) $AV = 2x \quad PV = 1x \quad i = 10\%$

$$2x = x(1+i)^4 = (1.1)^n$$

$$\log 2 = n \ln 1.1$$

$$n = 7.272$$

ii). $AV = 2x \quad PV = x \quad d^{12} = 10\%$

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

$$\ln 2 = -12n \ln .9167$$

$$n = 6.905 \text{ yrs.}$$