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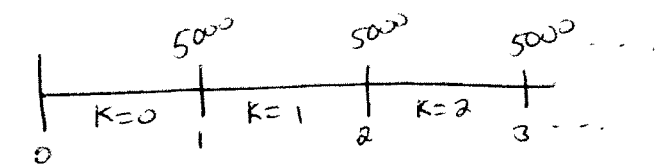
4

$$PV RV = Y = 5000 \ddot{Y}_{35} = 5000 \ddot{a}_{\overline{K+1}|} \quad K = K_{35}$$

$$EPV = E[Y] = 5000 \ddot{a}_{35} \stackrel{ILT}{=} 5000(15.3926)$$

$$= 76963$$

2) (See Video Solution)



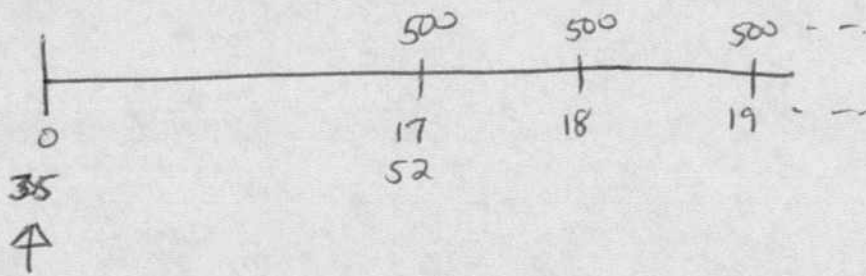
35

↑

$$PV = Y = 5000 Y_{35}$$

$$EPV = 5000 a_{35} = 71963$$

3)



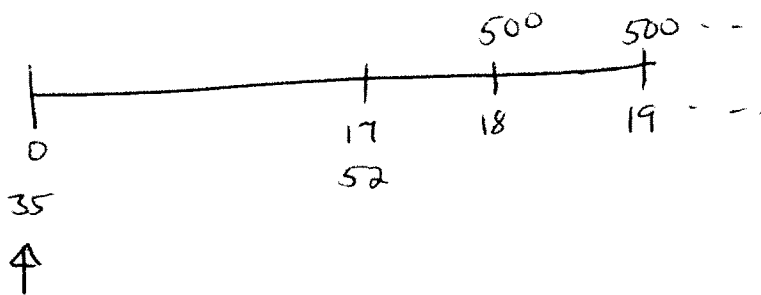
$$PV = 4 = 500 \cdot {}_{17|}\ddot{Y}_{35}$$

$$EPV = 500 \cdot {}_{17|}\ddot{a}_{35} = 500 \cdot {}_{17}E_{35} \cdot \ddot{a}_{52}$$

$${}_{17}E_{35} \stackrel{\text{ILT}}{\text{See Section 2}} .3485$$

$$\therefore EPV \stackrel{\text{ILT}}{=} 500 (.3485)(12.8879) = 2245.72$$

4)



$$PVRV = Y = 500 \cdot {}_{17|}Y_{35}$$

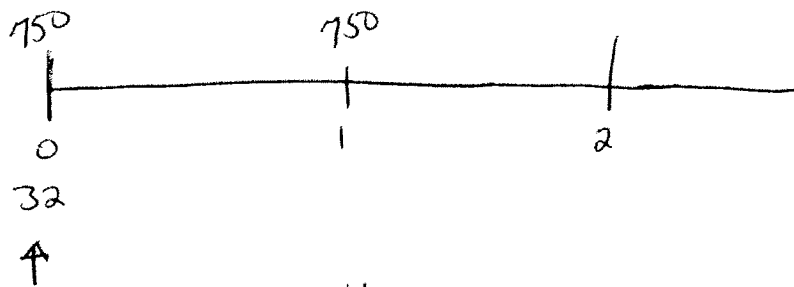
$$EPV = 500 \cdot {}_{17|}a_{35} = 500 \cdot {}_{17}E_{35} \cdot a_{52}$$

$${}_{17}E_{35} \stackrel{ILT}{=} .3485$$

$$a_{52} = \ddot{a}_{52} - 1$$

$$\therefore EPV = 500 (.3485)(11.8879) = 2071.47$$

5) (See Video Solution)

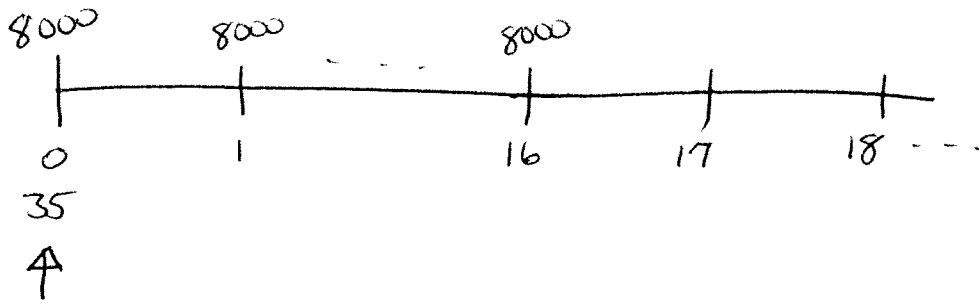


$$PVFV = Y = 750 \ddot{Y}_{32:2|}$$

$$EPV = 750 \ddot{a}_{32:2|} = 1456.34$$

$$\text{Var}(Y) = 850$$

6)



$$PVRV = Y = 8000 \ddot{Y}_{35:\overline{17}|}$$

$$EPV = 8000 \ddot{a}_{35:\overline{17}|}$$

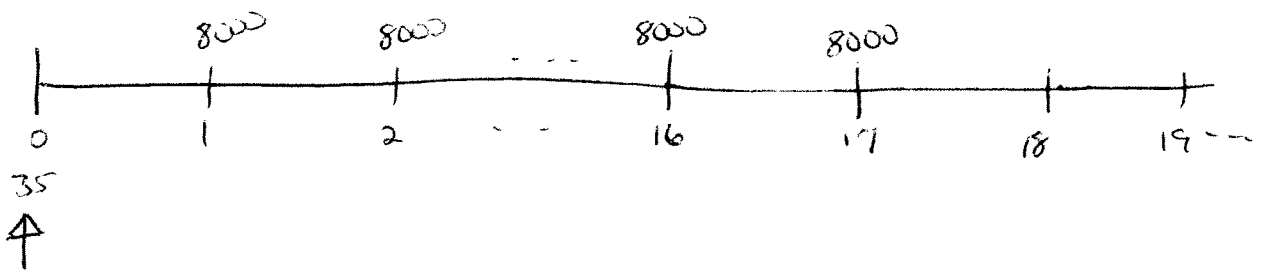
$$\ddot{a}_{35:\overline{17}|} = \ddot{a}_{35} - {}_{17}E_{35} \cdot \ddot{a}_{52}$$

$$\stackrel{FLT}{=} 15.3926 - (0.3485)(12.8879)$$

$$= 10.9012$$

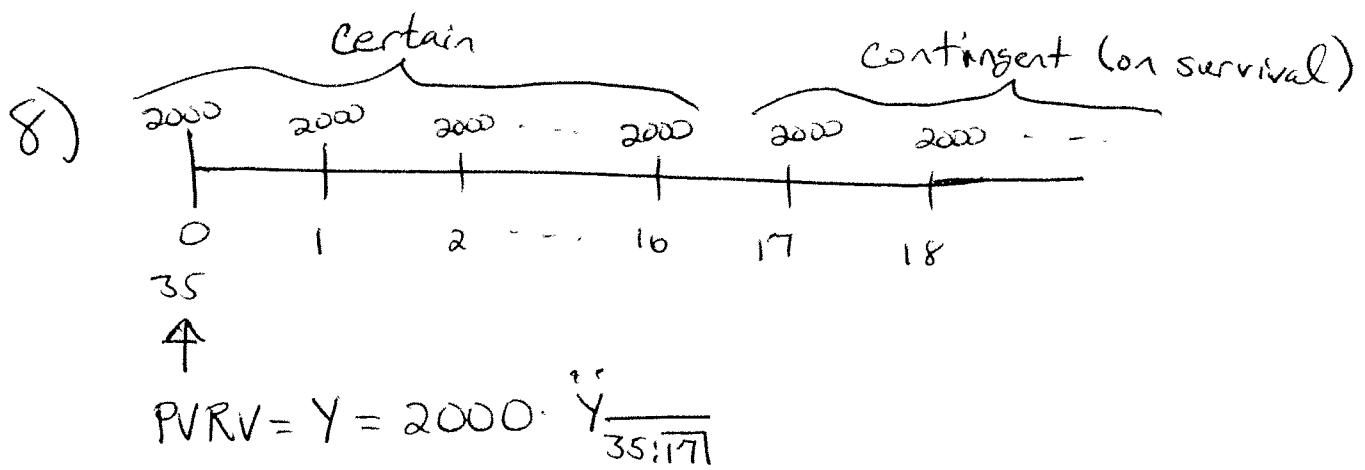
$$\therefore EPV = 8000(10.9012) = 87210$$

7) (See Video Solution)



$$PVRV = Y = 8000 Y_{35:17}$$

$$EPV = 82000$$



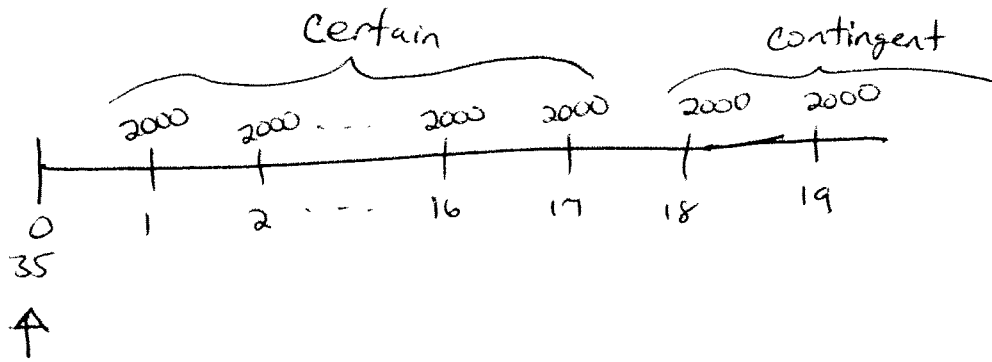
$$EPV = 2000 \ddot{a}_{35:\overline{17}|} = 2000 \ddot{a}_{\overline{17}|} + 2000 {}_{17|} \ddot{a}_{35}$$

$$\ddot{a}_{\overline{17}|} \stackrel{\text{TVM}}{=} 11.1059$$

$${}_{17|} \ddot{a}_{35} \stackrel{\#3}{=} (.3485)(12.8879) = 4.4914$$

$$\therefore EPV = 2000 \left(\overset{11.1059}{\cancel{10}} + 4.4914 \right) = 31195$$

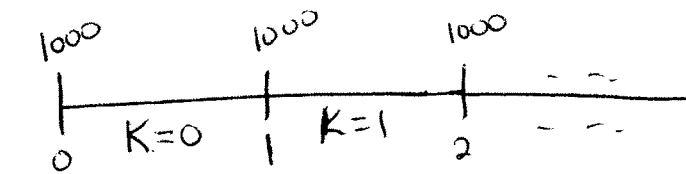
9) (See Video Solution)



$$PVRV = Y = 2000 Y_{\overline{35:17}|}$$

$$EPV = 2000 a_{\overline{35:17}|} = 29240$$

10)



$$K = K_{30:40}$$

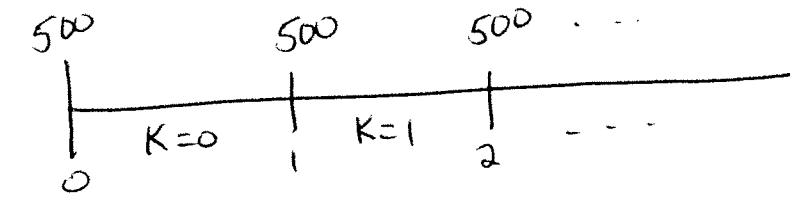
30:40



$$PVRV = Y = 1000 \ddot{Y}_{30:40}$$

$$EPV = 1000 \ddot{a}_{30:40} \stackrel{ILT}{=} 1000(14.2068) = 14206.80$$

11)



$$K = K \frac{\quad}{30:40}$$

30:40



$$PVRV = Y = 500 \ddot{Y}_{30:40}$$

$$EPV = 500 \ddot{a}_{30:40}$$

$$\ddot{a}_{30:40} = \ddot{a}_{30} + \ddot{a}_{40} - \ddot{a}_{30:40}$$

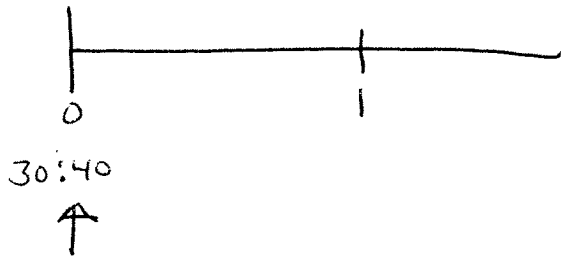
$$\stackrel{ILT}{=} 15.8561 + 14.8166 - 14.2068$$

$$= 16.4659$$

$$\therefore EPV = 500(16.4659) = 8232.95$$

12) (See Video Solution)

30 40	500	500	
40 30	750	750	---
30:40	1000	1000	

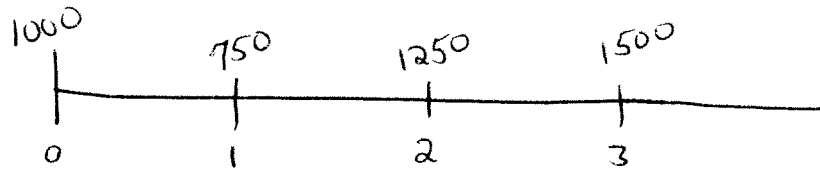


$$EPV = 15748.68$$

13) (See Video Solution)

$$APV = 247.14$$

14)



35

↑

$$q_{35} = .02$$

$$q_{36} = .025$$

$$q_{37} = .03$$

$$v = .95$$

PVRV = Y	P_r
1000	$q_{35} = .02$
$1000 + 750v$	${}_1p_{35} = P_{35} \cdot q_{36} = .98(.025)$
$1000 + 750v + 1250v^2$	${}_2p_{35} = {}_2P_{35} \cdot q_{37} = (.98)(.975)(.03)$
$1000 + 750v + 1250v^2 + 1500v^3$	${}_3P_{35} = 1 - .02 - .98(.025) - (.98)(.975)(.03)$

Rewriting

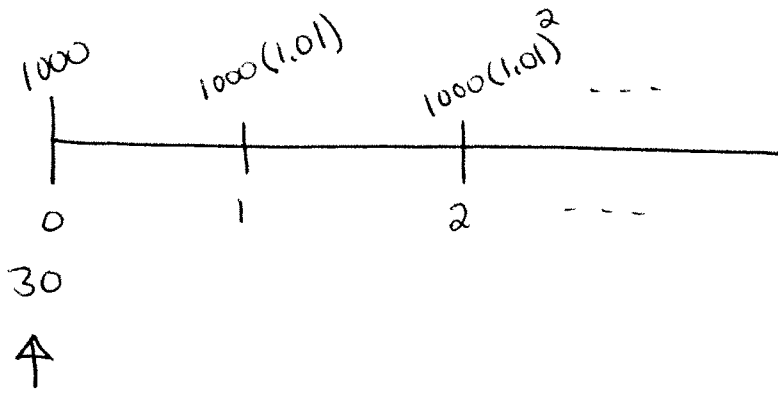
Y^2	Y	P_r
1000	1000	.02
1712.5	1712.5	.0196
1128.1446	1128.1446	.028665
2414.2071	2414.2071	.931735

$$E[Y] = 2335.30$$

$$E[Y^2] = 5544482.78$$

$$\therefore \text{Var}(Y) = E[Y^2] - (E[Y])^2 = 90850$$

15)



$$APV \stackrel{VEP}{=} 1000 + 1000(1.01)v P_{30} + 1000(1.01)^2 v^2 \cdot {}_2P_{30} + \dots \text{ (20 terms)}$$

$$v = \frac{1}{1.0706} \Rightarrow 1.01v = \frac{1.01}{1.0706} = \frac{1}{1.06}$$

($1.07 = (1.01)(1.06)$)

modify the interest rate to .06

~~then~~

$$= 1000 + 1000v_{.06} P_{30} + 1000 v_{.06}^2 \cdot {}_2P_{30} + \dots \text{ (20 terms)}$$

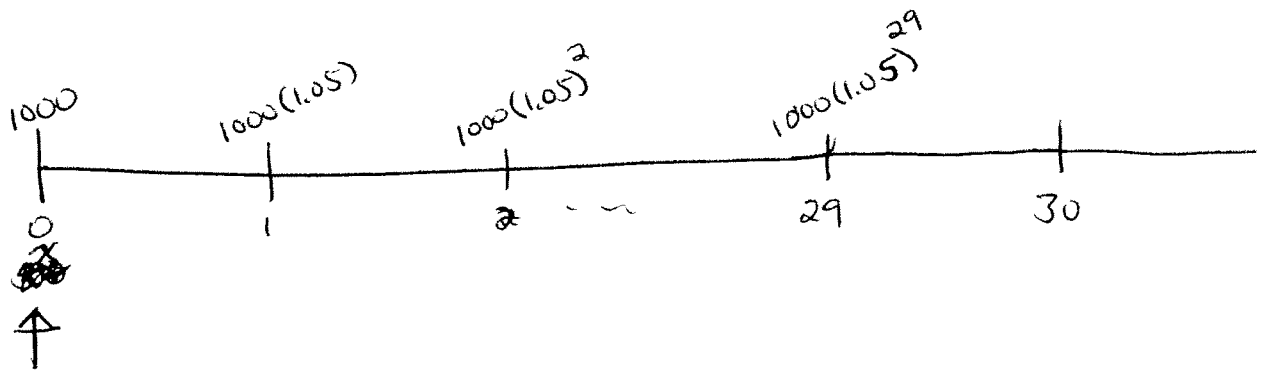
$$= 1000 \cdot \ddot{a}_{30:\overline{20}|} \quad \text{using } \underbrace{\text{ILT assumptions}}_{\text{mortality and interest}}$$

$$\ddot{a}_{30:\overline{20}|} = \ddot{a}_{30} - {}_{20}E_{30} \ddot{a}_{50}$$

$$\stackrel{\text{ILT}}{=} 15.8561 - (1.29374)(13.2668)$$

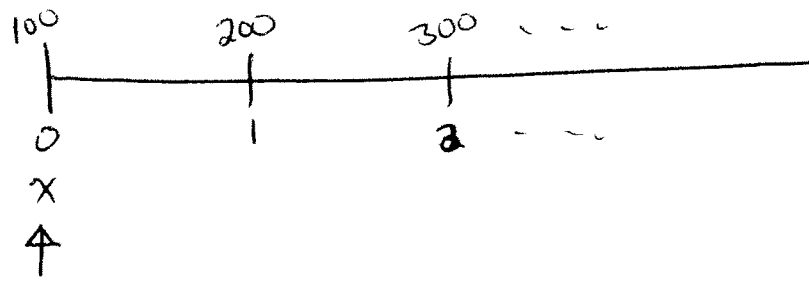
$$= \del{11959} 11960$$

16) (See Video Solution)



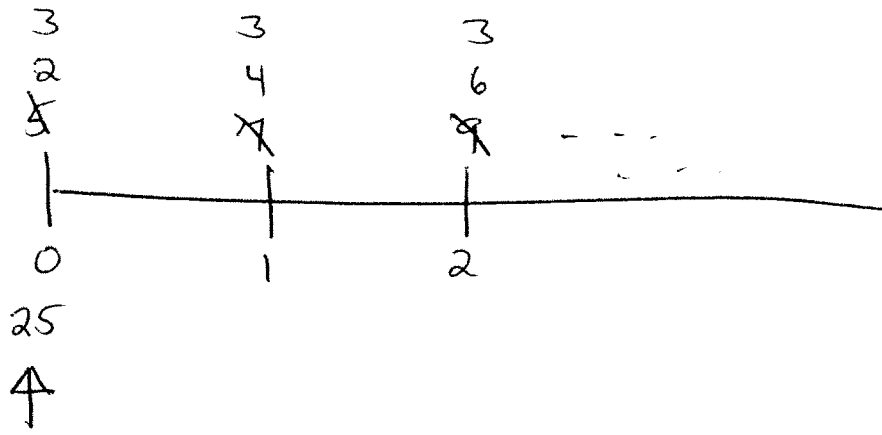
$$APV = 21300$$

17)



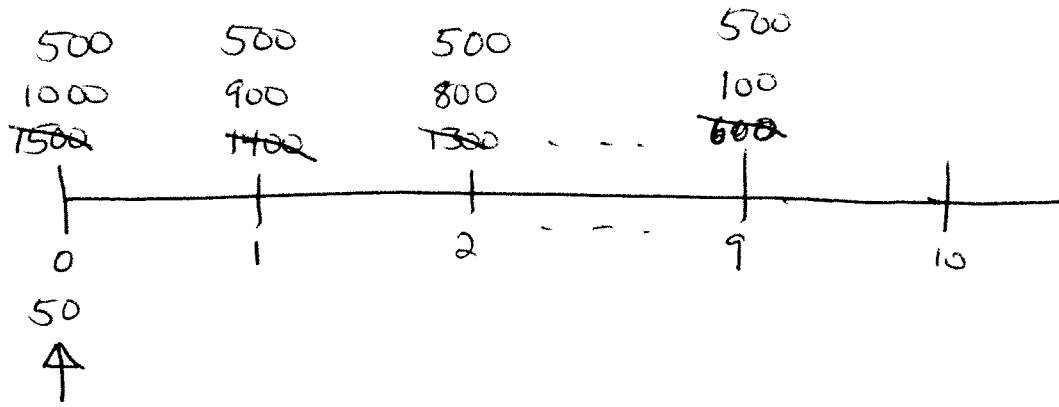
$$EPV = 100 (I \ddot{a})_x$$

18)



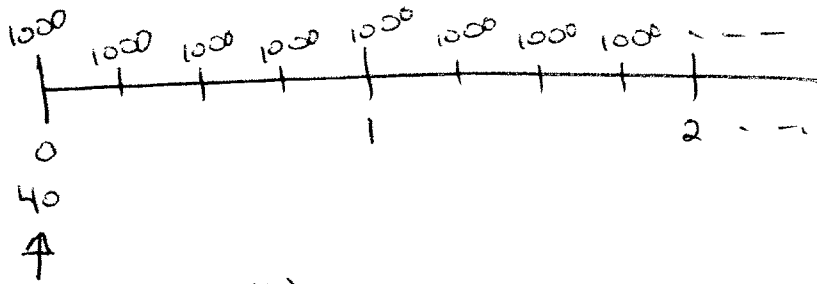
$$APV = 3 \ddot{a}_{\overline{25}|} + 2(I\ddot{a})_{\overline{25}|}$$

19)



$$EPV = 500 \ddot{a}_{50:\overline{10}|} + 100 (D\ddot{a})_{50:\overline{10}|}$$

20)



$$APV = 4000 \ddot{a}_{40}^{(4)}$$

$$(a) \quad \ddot{a}_{40}^{(4)} \stackrel{USD}{=} \alpha(4) \ddot{a}_{40} - \beta(4)$$

$$\stackrel{ILT}{=} (1.06027) \cdot (14.8166) - .38424$$

$$\therefore APV = 4000 \ddot{a}_{40}^{(4)} = \del{57745} 57745$$

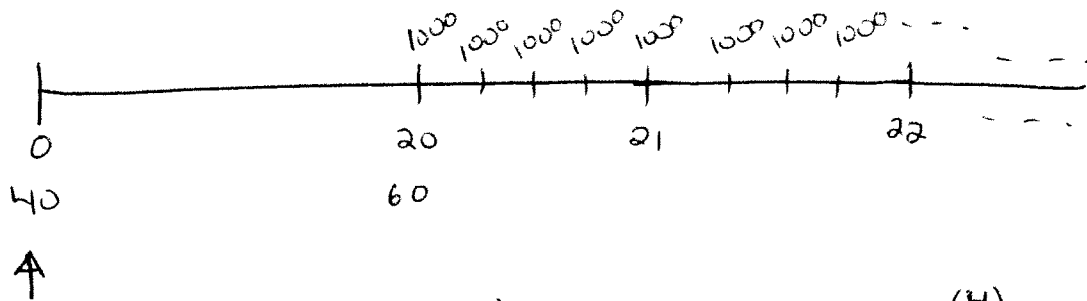
$$(b) \quad \ddot{a}_{40}^{(4)} \stackrel{WH}{=} \ddot{a}_{40} - \frac{3}{8} - \frac{15}{192} (\mu_{40} + 2)$$

$$\mu_{40} = -\frac{1}{2} \ln(2P_{39}) \stackrel{ILT}{=} -\frac{1}{2} \ln(.99463)$$

$$\int \stackrel{ILT}{=} \ln(1.06)$$

$$\therefore APV = 4000 \ddot{a}_{40}^{(4)} = \del{57745} 57747$$

21) (See Video Solution)



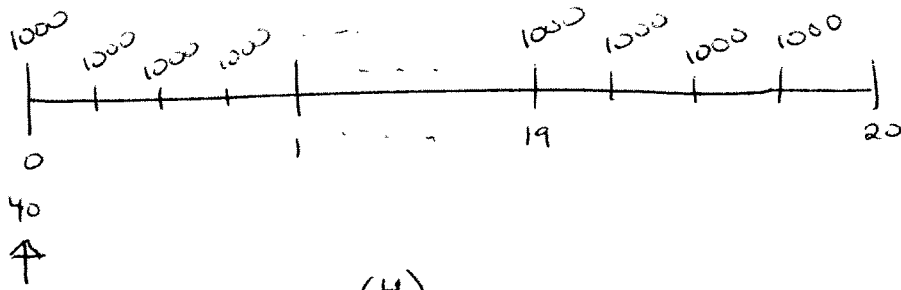
$$APV = 4000 \cdot {}_{20|} \ddot{a}_{40}^{(4)} = 4000 \cdot {}_{20} E_{40} \cdot \ddot{a}_{60}^{(4)}$$

(a) $APV = 11804$

(b) $APV = 11804$

(See Video Solution)

22)



$$APV = 4000 \ddot{a}_{40:\overline{20}|}^{(4)} = 45942$$