Question 1

P1) All cause annual mortality = 18/1000
Stroke death rate = 36.2/100,000
Non Stroke annual mortality = (18×100 − 36.2)/100,000 = 0.0176

$\lambda_0 = \frac{-1}{\Delta t} \ln(1 - r/N)$

$= \frac{-1}{1} \ln(1 - 0.0176)$

$= 0.0178$

P2) Annual rate first ever stroke = 15/1000
*assume constant across ages

$\lambda = \frac{-1}{\Delta t} \ln(1 - r/N)$

$= -1/1 \ln(1 - 15/1000)$

$= 0.0151$

P3)

$\frac{\lambda_1}{\lambda_1 + \lambda_2}$ $\frac{\lambda_2}{\lambda_1 + \lambda_2}$

where $\lambda_1 + \lambda_2 = 0.0151$

$\frac{\lambda_1}{\lambda_1 + \lambda_2} = 0.9$ $\frac{\lambda_2}{\lambda_1 + \lambda_2} = 0.1$

$\frac{\lambda_1}{0.0151} = 0.9$ $\frac{\lambda_2}{0.0151} = 0.1$

$\lambda_1 = 0.0136$ $\lambda_2 = 0.00151$

P4) $\Delta t = 5$

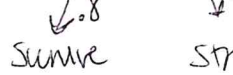
$r/N = 0.17$

$\lambda_{\text{recurrent stroke}} = \frac{-1}{\Delta t} \ln(1 - r/N)$

$= \frac{-1}{5} \ln(1 - 0.17)$

$= 0.037$

P5) Recurrent Stroke



where $\lambda_3 + \lambda_4 = 0.037$

$\frac{\lambda_3}{\lambda_3 + \lambda_4} = 0.8$ $\frac{\lambda_4}{\lambda_3 + \lambda_4} = 0.2$

$\frac{\lambda_3}{0.037} = 0.8$ $\lambda_3 = 0.03$

$\frac{\lambda_4}{\quad} = 0.2$ $\lambda_4 = 0.0075$

P6) Time in Stroke = 1 week = 1/52 years

λ_5 = Annual rate of transition from Stroke → Post Stroke

$1/52 = 1/\lambda_5$

$\lambda_5 = 52$