Question 1 Use ILT and the assumption of UDD to compute ${}_{2.25}p_{85.5}$.

Question 2 Consider the joint life status $(x:y)$, where $x \geq 0,\ y \geq 0$ and the RV's $T(x)$ and $T(y)$ are independent and identically distributed as a uniform RV $U \sim Uni[0,\ 1]$. Compute the full expectancy of life $\mathring{e}_{x:y}$.

Q. 1

$$
\begin{aligned}
{}_{2.25}p_{85.5} &= {}_{0.5}p_{85.5} \cdot p_{86} \cdot {}_{0.75}p_{87} \\
&= \frac{l_{86}}{l_{85.5}} \cdot \frac{l_{87}}{l_{86}} \cdot \frac{l_{87.75}}{l_{87}} \\
&= \frac{l_{87.75}}{l_{85.5}} = \frac{0.75\, l_{88} + 0.25\, l_{87}}{0.5\, l_{86} + 0.5\, l_{85}} \\
&= \frac{0.75 \cdot 15{,}247.58 + 0.25 \cdot 17{,}872.99}{0.5 \cdot 20{,}660.90 + 0.5 \cdot 23{,}582.45} \\
&\approx \frac{15{,}904}{22{,}122} = 0.7189
\end{aligned}
$$

Q 2

$$
\mathring{e}_{x:y} \stackrel{\text{def}}{=} \int_0^1 {}_tp_x \, {}_tp_y \, dt = \int_0^1 (1-t)(1-t)\,dt = \int_0^1 (1-t)^2\,dt
$$

$$
= \int_0^1 \frac{1}{3}\, d(1-t)^3 = \frac{1}{3}
$$

The End.