Will Mohr

$\mu_x = \frac{1}{x+1}, x \geq 0$ $F_x, S_x, f(x)$

$S_x = e^{-\int_0^x \mu_z dz} = e^{-\int_0^x \frac{1}{x+1} dx} = e^{-\ln(z+1)|_0^x} = e^{-\ln(x+1)}$

$= (x+1)^{-1} = \frac{1}{x+1}$

$F_x = 1 - \frac{1}{x+1}$ $f(x) = \frac{1}{(x+1)^2}$

Is S_x valid?

$S_0 = \frac{1}{0+1} = 1$ $S_\infty = \frac{1}{\infty+1} = \frac{1}{\infty} \Rightarrow 0$

$\frac{d}{dx}\left(\frac{1}{x+1}\right) = -\frac{1}{(x+1)^2} < 0 \ \forall x \ \exists \ \mathbb{R}^+$

l_x

$F_x, S_x, f(x)$ $\mu_x = \frac{1}{x+1}$ ${}_{10}p_{40} = \frac{S_{50}}{S_{40}} = \frac{\frac{1}{51}}{\frac{1}{41}} = \frac{41}{51} =$

$.8039$

${}_{20}p_{50} = \frac{\frac{1}{71}}{\frac{1}{51}} = \frac{51}{71} = .7183$

${}_{10|20}q_{40} =$ ~~${}_{30}q_{40} - {}_{10}q_{40}$~~ $\Rightarrow {}_{30}q_{40} \cdot {}_{10}q \ {}_{10}p_{40}$

${}_{10|20}q_{40} =$ probability a 40 y.o. lives for 10 years and then dies within the following 20 yrs.

$= {}_{30}q_{40} - {}_{10}q_{40}$ or ${}_{10}p_{40} - {}_{30}p_{40} = \frac{41}{51} - \frac{41}{71} = .2265$

$l_{20} = 1000000$ $\quad l_{80} = l_{20} \cdot {}_{60}p_{20}$ $\quad \boxed{\frac{21}{81}} \times 1000000$

$= 259259.\overline{259}$