Question #31
Answer: B

The survival function is $S_0(t)=\left(1-\dfrac{t}{\omega}\right)$:

Then,

$$\mathring{e}_x=\frac{\omega-x}{2}\ and\ {}_tp_x=\left(1-\frac{t}{\omega-x}\right)$$

$$\mathring{e}_{45}=\frac{105-45}{2}=30$$

$$\mathring{e}_{65}=\frac{105-65}{2}=20$$

$$\mathring{e}_{45:65}=\int_0^{40}{}_tp_{45:65}dt=\int_0^{40}\frac{60-t}{60}\times\frac{40-t}{40}dt$$

$$=\frac{1}{60\times40}\left(60\times40\times t-\frac{60+40}{2}t^2+\frac{1}{3}t^3\right)\Big|_0^{40}$$

$$=15.56$$

$$\mathring{e}_{\overline{45:65}}=\mathring{e}_{45}+\mathring{e}_{65}-\mathring{e}_{45:65}$$
$$=30+20-15.56=34$$

In the integral for $\mathring{e}_{45:65}$, the upper limit is 40 since 65 (and thus the joint status also)
can survive a maximum of 40 years.

Question #32
Answer: E

$$\mu_4=-S_0'(4)/S_0(4)$$

$$=\frac{-\left(-e^4/100\right)}{1-e^4/100}$$

$$=\frac{e^4/100}{1-e^4/100}$$

$$=\frac{e^4}{100-e^4}=1.202553$$