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STAT 472
Quiz 2
Fall 2021
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1. You are given that ${}_t p_{95} = 1 - 0.008t^3$ for $0 \leq t \leq 5$.

Calculate ${}^{\circ}e_{95} - e_{95}$.

Solution:

$${}^{\circ}e_{95} = \int_0^5 {}_t p_{95} dt = \int_0^5 (1 - 0.008t^3) dt = \left[t - 0.002t^4 \right]_0^5 = \left[5 - (0.002)(5)^4 \right] - [0 - 0] = 3.75$$

$$e_{95} = \sum_{k=1}^5 {}_k p_{95} = \sum_{k=1}^5 (1 - 0.008k^3)$$

$$= 1 - 0.008(1)^3 + 1 - 0.008(2)^3 + 1 - 0.008(3)^3 + 1 - 0.008(4)^3 + 1 - 0.008(5)^3 = 3.2$$

$${}^{\circ}e_{95} - e_{95} = 3.75 - 3.2 = 0.55$$

2. You are given that mortality follows Gompertz Law with $B = 0.00028$ and $c = 1.1$.

Calculate $f_{45}(10)$.

Solution:

$$f_x(t) = {}_t p_x \cdot \mu_{x+t}$$

$$f_{45}(10) = {}_{10} p_{45} \cdot \mu_{45+10} = \exp\left[-\frac{0.00028}{\ln(1.1)}(1.1)^{45}[(1.1)^{10} - 1]\right] \cdot 0.00028(1.1)^{55} = 0.03763$$

