Each problem is worth 10 points. Show all work for full credit, and use correct notation.

1. Given $\mu_x = 0.03$, for all $x$, determine $20p_{10}$

2. Given $\int_{20}^{40} \mu_x \, dx = 0.1$ and $\int_0^5 \mu_{40+t} \, dt = 0.05$, determine $25q_{20}$

3. Given $\int_0^{20} t p_{50} \mu_{50+t} \, dt = 0.15$ and $5|_{15} q_{50} = 0.10$, determine $\int_0^5 t p_{50} \mu_{50+t} \, dt$
4. Given \( tP_{40} = \frac{60-t}{60} \), for \( 0 \leq t \leq 60 \), determine \( e^0_{40} \).

5. Given \( e_{50} = 24.5 \) and \( e_{51} = 24.0 \), determine \( q_{50} \).