Each problem is worth 10 points. Show all work for full credit, and use correct notation. Simplify answers completely. Assume all lives are independent of one another.

For numbers 1 and 2: Male mortality follows a $DML(\omega = 90)$ model and female mortality follows a $GDM\ell(\alpha = 1.5, \omega = 100)$ model.

1. Determine $\overline{q}_{20:30}$ where (20) is a female and (30) is a male.

2. Determine $\epsilon^{0}_{20:30}$ where (20) is a male and (30) is a female.
For numbers 3 – 5: Smoker mortality follows a constant force model with $\mu = 0.02$, whereas non-smoker mortality follows a $DML(\omega = 100)$ model.

3. Determine $_{10}p_{30:50}$ where (30) is a smoker and (50) is a non-smoker.

4. Determine $_{10}q_{30:50}^{1}$ where (30) is a smoker and (50) is a non-smoker.

5. Determine $e_{30:40:10}$ where both (30) and (40) are smokers.