

### Question #123

Answer: B

$$\begin{aligned} {}_5|q_{\overline{35:45}} &= {}_5|q_{35} + {}_5|q_{45} - {}_5|q_{35:45} \\ &= {}_5p_{35}q_{40} + {}_5p_{45}q_{50} - {}_5p_{35:45}q_{40:50} \\ &= {}_5p_{35}q_{40} + {}_5p_{45}q_{50} - {}_5p_{35} \times {}_5p_{45} (1 - p_{40:50}) \\ &= {}_5p_{35}q_{40} + {}_5p_{45}q_{50} - {}_5p_{35} \times {}_5p_{45} (1 - p_{40}p_{50}) \\ &= (0.9)(0.03) + (0.8)(0.05) - (0.9)(0.8)[1 - (0.97)(0.95)] \\ &= 0.01048 \end{aligned}$$

Alternatively,

$${}_6p_{35} = {}_5p_{35} \times p_{40} = (0.90)(1 - 0.03) = 0.873$$

$${}_6p_{45} = {}_5p_{45} \times p_{50} = (0.80)(1 - 0.05) = 0.76$$

$$\begin{aligned} {}_5|q_{\overline{35:45}} &= {}_5p_{\overline{35:45}} - {}_6p_{\overline{35:45}} \\ &= ({}_5p_{35} + {}_5p_{45} - {}_5p_{35:45}) - ({}_6p_{35} + {}_6p_{45} - {}_6p_{35:45}) \\ &= ({}_5p_{35} + {}_5p_{45} + {}_5p_{35} \times {}_5p_{45}) - ({}_6p_{35} + {}_6p_{45} - {}_6p_{35} \times {}_6p_{45}) \\ &= (0.90 + 0.80 - 0.90 \times 0.80) - (0.873 + 0.76 - 0.873 \times 0.76) \\ &= 0.98 - 0.96952 \\ &= 0.01048 \end{aligned}$$