22. Solution: D
Let
\[ H = \text{Event of a heavy smoker} \]
\[ L = \text{Event of a light smoker} \]
\[ N = \text{Event of a non-smoker} \]
\[ D = \text{Event of a death within five-year period} \]

Now we are given that \( \Pr[D|L] = 2 \Pr[D|N] \) and \( \Pr[D|L] = \frac{1}{2} \Pr[D|H] \)

Therefore, upon applying Bayes' Formula, we find that
\[
\Pr[H|D] = \frac{\Pr[D|H] \Pr[H]}{2 \Pr[D|L](0.2) + \Pr[D|L](0.5) + 2 \Pr[D|L](0.3)} = \frac{0.4}{0.25 + 0.3 + 0.4} = 0.42
\]

23. Solution: D
Let
\[ C = \text{Event of a collision} \]
\[ T = \text{Event of a teen driver} \]
\[ Y = \text{Event of a young adult driver} \]
\[ M = \text{Event of a midlife driver} \]
\[ S = \text{Event of a senior driver} \]

Then using Bayes’ Theorem, we see that
\[
\Pr[Y|C] = \frac{\Pr[C|Y] \Pr[Y]}{\Pr[C|T] \Pr[T] + \Pr[C|Y] \Pr[Y] + \Pr[C|M] \Pr[M] + \Pr[C|S] \Pr[S]} = \frac{(0.08)(0.16)}{(0.15)(0.08) + (0.08)(0.16) + (0.04)(0.45) + (0.05)(0.31)} = 0.22
\]

24. Solution: B
Observe
\[
\Pr[N \geq 1|N \leq 4] = \frac{\Pr[1 \leq N \leq 4]}{\Pr[N \leq 4]} = \frac{\frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30}}{\frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30}} = \frac{10 + 5 + 3 + 2}{30 + 10 + 5 + 3 + 2} = \frac{20}{50} = \frac{2}{5}
\]