

QUIZ #2

Please, show your work and write legibly.

*NOTE: you can leave your solution in terms of products of fractions and/or binomials; you do not need to compute the numerical value*

(1) Two cards are drawn successively and without replacement from a 52-card deck of playing cards. Compute the probabilities associated with the events below:

(a) drawing no heart in both draws;

$$P(\text{no}\heartsuit, \text{no}\heartsuit) = P(\text{no}\heartsuit)P(\text{no}\heartsuit|\text{no}\heartsuit) = \frac{39}{52} \frac{38}{51} = 0.5588$$

(b) drawing a ace on the first draw, a heart on the second draw.

$$\begin{aligned} P(A, \heartsuit) &= P(A\text{-no}\heartsuit)P(\heartsuit|A\text{-no}\heartsuit) + P(A^\heartsuit)P(\heartsuit|A^\heartsuit) \\ &= \frac{3}{52} \frac{13}{51} + \frac{1}{52} \frac{12}{51} = 0.0192 \end{aligned}$$

(2) Four cards are drawn successively and without replacement from a 52-card deck of playing cards. Compute the probabilities associated with the events below:

(a) drawing a heart on the first draw, a heart on the second draw, a club on the third draw, a heart of the fourth draw;

$$\begin{aligned} P(\heartsuit, \heartsuit, \clubsuit, \heartsuit) &= P(\heartsuit \text{ 1st draw})P(\heartsuit \text{ 2nd draw} | (\heartsuit \text{ 1st draw}))P(\clubsuit \text{ 3rd draw} | (\heartsuit \text{ 1st, 2nd draw})) \\ &\times P(\heartsuit \text{ 4th draw} | (\heartsuit \text{ 1st, 2nd draw}), \clubsuit \text{ 3rd draw}) \\ &= \frac{13}{52} \frac{12}{51} \frac{13}{50} \frac{11}{49} = 0.0034 \end{aligned}$$

(b) drawing the third heart on the fourth draw.

$$\begin{aligned} P(\text{third heart on the 4th draw}) &= P(2\heartsuit \text{ in 3 draws})P(\heartsuit \text{ in 4th draw} | (2\heartsuit \text{ in 2 draws})) \\ &= \frac{\binom{13}{2}\binom{39}{1}}{\binom{52}{3}} \frac{11}{49} \end{aligned}$$