

52 x 51 x 50 x 49 x 48

(52)  
(5)

A 1. What is the probability that the board contains exactly four clubs?  
a. 1.07%    b. 1.83%    c. 2.45%    d. 2.90%    e. None of the above.

B 2. What is the probability that the board contains exactly four clubs, given your two hole cards are the ace and king of clubs?  
a. 0.403%    b. 0.607%    c. 0.954%    d. 1.08%    e. None of the above.

0.49 x 8 v39  
v51 x 50 x 49 x 48

D 3. Suppose a particular player plays on average 10 hands of poker per day. You choose a day at random and  $X$  = the number of hands the player played on the day. What does the Markov inequality tell you about  $P(X \geq 50)$ ?  
a.  $P(X \geq 50) \leq 0.057$ .    b.  $P(X \geq 50) \leq 0.107$ .    c.  $P(X \geq 50) \leq 0.181$ .  
d.  $P(X \geq 50) \leq 0.200$ .    e.  $P(X \geq 50) \leq 0.429$ .    f. None of the above.

$\frac{\binom{11}{4} \cdot 39}{\binom{52}{5}}$   
 $\frac{E(X)}{c} = \frac{10}{50} = 0.2$

B 4. Let  $X$  = the number of diamonds on the flop. What is  $E(X)$ ?  
a. 0.500    b. 0.750    c. 1.24    d. 1.50    e. None of the above.

C 5. Let  $X$  = the number of black cards in your hand, so  $X$  must be 0, 1, or 2. What is  $E(X^2)$ ?  
a. 0.75    b. 1.10    c. 1.49    d. 1.77    e. None of the above.

$\binom{26}{1}$

D 6. Let  $X$  = the number of hands until the first time you are dealt AK. What is the standard deviation of  $X$ ?  
a. 40.0    b. 53.1    c. 62.9    d. 82.4    e. None of the above.

$\frac{13 \times 12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{52 \times 51 \times 50 \times 49 \times 48 \times 47 \times 46 \times 45 \times 44 \times 43 \times 42 \times 41 \times 40}$   
 $P = \frac{16}{\binom{52}{2}}$

A 7. Suppose you play exactly 20 hands of poker. Let  $X$  = the number of hands where you are dealt AK. What is the variance of  $X$ ?  
a. 0.238    b. 0.629    c. 1.21    d. 1.70    e. None of the above.

For the next four problems, A = the event the flop contains at least one king.  
B = the event the 3 cards on the flop are all kings.  
C = the event that the 3 cards on the flop are all black.

A 8. Find  $P(B|C)$ .  
a. 0    b. 12.2%    c. 12.8%    d. 13.3%    e. None of the above.

C 9. What is  $P(A)$ ?  
a. 10.0%    b. 15.7%    c. 21.7%    d. 32.5%    e. None of the above.

B 10. What is  $P(A \text{ and } C)$ ?  
a. 1.97%    b. 2.61%    c. 3.02%    d. 3.71%    e. None of the above.

B 11. Are A and C independent?  
a. Yes    b. No    c. Cannot be determined    d. None of the above.

A 12. Suppose  $X = 0$  with probability  $1/2$ ,  $X = 1$  with probability  $1/6$ , and  $X = 2$  with probability  $1/3$ . What is the moment generating function of  $X$ ?

a.  $1/2 + 1/6 e^t + 1/3 e^{2t}$     b.  $1/3 + 1/6 e^t$     c.  $1/3 + 1/6 e^t + 1/2 e^{2t}$     d.  $1/3 + 1/2 e^t + 1/6 e^{2t}$     e. None of the above.

C 13. Suppose you have  $K\clubsuit K\spadesuit$ , I have  $8\clubsuit 8\heartsuit$ , and the board is  $3\heartsuit 5\diamondsuit 8\spadesuit 9\diamondsuit$ . The pot is \$100 when the river is the  $K\heartsuit$ . How much expected profit did you gain due to luck on the river?  
a. \$82.3    b. \$87.8    c. \$95.5    d. \$99.0    e. None of the above.

$100\% (100) - \left(\frac{2}{44}\right) (100)$   
95.5