$\binom{52}{2}$ 0.245 $\binom{52}{2}$ 0.012066 $E(XY) = E(X)E(Y)$

D 8. Suppose you play one hand, and X = 1 if you are dealt two red cards and X = 0 otherwise. Y = 1 if you are dealt AK and Y = 0 otherwise. What is cov(X,Y)?
a. -0.00128%. b. -0.00179%. c. 0.00107%. d. 0.00591%. e. None of the above.

C 9. If (X,Y) are bivariate normal with E(X) = 20, var(X) = 25, E(Y) = 16, var(Y) = 9, and ρ = 0.5, what is the distribution of Y given X = 30?
a. $N(22.3, 3.52^2)$. b. $N(22.3, 4.52^2)$. c. $N(19.0, 2.60^2)$. d. $N(19.0, 3.52^2)$. e. None of the above.

For the next three problems, suppose a face card is a jack, queen or king. Let A = the event your two hole cards are both face cards, and B = the event your two hole cards are both diamonds.

$\binom{12}{2}\binom{52}{2} + \binom{13}{2}\binom{52}{2} - \binom{3}{2}\binom{52}{2}$

A 10. What is P(A or B)?
a. 10.6%. b. 11.3%. c. 12.9%. d. 14.1%. e. None of the above.

D 11. What is P(A and B)?
a. 0.102%. b. 0.193%. c. 0.204 %. d. 0.226%. e. None of the above.

$\binom{3}{2}\binom{52}{2} \times 100$

D 12. What is P(A|B)?
a. 1.05%. b. 2.42%. c. 2.67%. d. 3.85%. e. None of the above.

$\frac{P(AB)}{P(B)}$ $\frac{\binom{3}{2}}{\binom{13}{2}}$

For the next two problems, suppose you are playing 20 hands of Texas Holdem. Let X = the number of times you get dealt AK out of your first 10 hands, and Y = the number of hands where you get dealt at least one club, out of hands 11 through 20. Let Z = 4X + 2Y.

$\text{var}(X) + \text{var}(Y) + 2[E(XY) - E(X)E(Y)]$

4×0.119208

C 13. What is E(Z)?
a. 8.12. b. 8.33. c. 9.31. d. 9.89. e. None of the above.

$(20^2)($

X B 14. What is Var(Z)?
a. 5.95. b. 7.95. c. 11.8. d. 13.3 e. None of the above.

$20 \times n \times q = 5.95$ 0.114

$0.5 \times \frac{3}{5} = 0.5 \times 0.6 = 0.3$

$E(X) = 10 \times \frac{\binom{4}{2}\binom{48}{0}}{\binom{52}{2}} = 0.1206$

a) $B_2 = \rho \frac{\sigma_y}{\sigma_x} =$

$16 = B_1 + 0.3(20)$

$B_1 = 10$

20x npq

$E(Y) = 1 - P(\text{NO CLUBS})$

$= 1 - \frac{\binom{39}{2}}{\binom{52}{2}} \times 10$

$= 4.41$

$9 = (0.3)^2(25) + \text{var}(\varepsilon)$

$\text{var}\,\varepsilon = 6.75 = 2.60^2$

$Y = 10 + 0.3(30)$

$= 19$

$Z = 4(0.1206) + 2(4.41)$

$= 9.31$

A 1. Suppose your opponent bets 3 times the number of chips [illegible] would only do that if she had a pocket pair, AK, or AQ. In fact, you know she does this 30% of the time when she has a pocket pair, 60% of the time when she has AK, and 40% of the time when she has AQ. Given only this, and no info about your cards or anyone else's cards, what is the probability that she has AK?

a. 24.4%. b. 31.4%. c. 40.0%. d. 43.2%. e. None of the above.

B 2. Suppose X = 1 with probability 1/2, and X = -1 with probability 1/2. What is the moment generating function of X?

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

B 3. Suppose you are in a winner take all tournament with 1000 chips left. You have Q♥ 10♥. The board is 2♥ 3♥ 4♠. There are 400 chips in the pot when the betting on the flop is done. You are up against one opponent who you believe has 5♣ 6♣ for a straight. The turn is the 7♠. Your opponent now goes all in for 100 chips. Should you call? Assume only knowledge of your cards, the board, and your opponent's cards.

a. Yes, because your probability of winning is 22.4% which is greater than the necessary 16.7% you need to justify a call.

b. Yes, because your probability of winning is 20.5% which is greater than the necessary 16.7% you need to justify a call.

c. No, because your probability of winning is 20.5% which is less than the necessary 29.2% you need to justify a call.

d. No, because your probability of winning is 20.0% which is less than the necessary 29.2% you need to justify a call.

e. None of the above.

A 4. Continuing the previous problem, what was your opponent's expected profit, in chips, gained due to luck when the 7♠ was revealed as the turn card? Recall that at this point the pot size was 400 chips.

a. 63.6. b. 72.9. c. 81.4. d. 85.5. e. None of the above.

C 5. Suppose X and Y are bivariate normal with mean 0 and variance 1, and cov(X,Y) = 0.2. What is cov(5X+Y, 4X-2Y)?

a. 12.2. b. 14.8. c. 16.8. d. 19.1. e. None of the above.

For the next two problems, let $X = N(0, 0.3^2)$. Let $\varepsilon = N(0, 0.2^2)$ where ε is independent of X, and let $Y = 7 + 0.4\,X + \varepsilon$.

A 6. What is E(Y|X)?

a. $7 + 0.4X$. b. $0.4\,X + \varepsilon$. c. 7. d. $7 + 0.4\,X + 0.2$. e. None of the above.

D 7. What is cov(X,Y)?

a. 0. b. 0.025. c. 0.032. d. 0.036. e. None of the above.