Stat 100a midterm, Prof. Rick Paik Schoenberg, 7/21/20, 10am-11:15pm.

1. Download your exam from www.stat.ucla.edu/~frederic/100A/S20 . If the LAST 3 digits of your student ID number are between 000 and 333, then use exam2a.pdf. If the LAST 3 digits are between 334 and 666, use exam 2b.pdf. If the LAST 3 digits are between 667 and 999, use exam 2c.pdf.
2. At 11:15am, you must email me your answers. Write your name and your student ID number at the top of your email. You do not have to show work. Just email me something like
Jane Smith.
ID 102817104
AEBED DDEBC AAC.
3. The exam will only be 75 minutes, from 10am to 11:15am. Then I will let you have a 5 min break and then lecture from 11:20 to 11:50am.
4. The exam has 13 multiple choice questions on it. They are all worth the same amount.
5. NO cheating! Answers must be done independently. No communication or internet surfing during the exam. Login to the zoom site as usual and keep your video on throughout the exam.
6. You may use a calculator, a pen or pencil, and any books and notes you want and even your computer during the exam, but no communication or surfing the web.
7. No partial credit is given for multiple choice questions. Choose ONE answer only.
8. Final numerical answers have been rounded to 3 significant digits, or to the nearest integer for numbers greater than 999.
9. If you have questions during the exam, feel free to ask them by typing them privately to me in the chat.

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 + Y/2.

____ 1. What is E(Z)?
a. 1.99. b. 2.69. c. 3.30. d. 9.89. e. None of the above.

____ 2. What is Var(Y)?
a. 2.05. b. 2.20. c. 2.47. d. 2.85. 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.

____ 3. What is P(A or B)?
a. 10.6%. b. 11.3%. c. 12.9%. d. 14.1%. e. None of the above.

____ 4. What is P(A and B)?
a. 0.102%. b. 0.193%. c. 0.204 %. d. 0.226%. e. None of the above.

____ 5. What is P(A|B)?
a. 1.05%. b. 2.42%. c. 2.67%. d. 3.85%. e. None of the above.

____ 6. Suppose you are in a winner take all tournament with 1000 chips left. You have 2♣ 2♠. The board is 2♥ 3♥ 4♠. There are 300 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 22.7% which is greater than the necessary 20.0% you need to justify a call.
b. Yes, because your probability of winning is 25.0% which is greater than the necessary 20.0% you need to justify a call.
c. No, because your probability of winning is 20.5% which is less than the necessary 25.0% you need to justify a call.
d. No, because your probability of winning is 20.0% which is less than the necessary 25.0% you need to justify a call.
e. None of the above.

____ 7. Continuing the previous problem, suppose you call and the river is the 8♠. What was your opponent's expected profit, in chips, gained due to luck when the 8♠ was revealed as the river card? Recall that at this point the pot size was 500 chips.
a. 43.6. b. 71.9. c. 102. d. 114. e. None of the above.

____ 8. Suppose X = 2 with probability 1/2, and X = 0 with probability 1/2. What is the moment generating function of *X*?
a. 1. b. $e^{-2t}/3$. c. $e^{2t}/2 + 1/2$. d. $1/2 + e^{t}/2$. e. $1/2 + e^{t}/2 + e^{2t}/2$. f. None of the above.

____ 9. Suppose you play one hand of Texas Holdem, and X = 1 if you are dealt two cards that are both diamonds and X = 0 otherwise. Y = 1 if you are dealt AK and Y = 0 otherwise. What is cov(X,Y)?
a. 0.0000128. b. 0.0000444. c. -0.00107. d. 0. e. None of the above.

____ 10. Suppose X and Y are bivariate normal with mean 0 and variance 1, and cov(X,Y) = 0.4. What is cov(5X+Y, 4X-3Y)?
a. 12.6. b. 14.8. c. 16.8. d. 19.1. e. None of the above.

_____ 11. Let X = $N(0, 0.4^2)$. ε = $N(0, 0.2^2)$ where ε is independent of X, and Y = 7 + 0.5 X + ε. What is cov(X,Y)?
a. 0. b. 0.0250. c. 0.0800. d. 0.0926. e. None of the above.

____ 12. If (X,Y) are bivariate normal with E(X) = 20, var(X) = 25, E(Y) = 16, var(Y) = 9, and ρ = 0.7, 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. $N(20.2, 2.14^2)$. e. None of the above.

____ 13. Suppose your opponent bets 3 times the number of chips in the pot, and you know she 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, 80% 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. 30.0%. c. 40.0%. d. 43.2%. e. None of the above.