S O L U T I O N S

(1) Which of the statements below is true if the slope of the OLS line through the scatter plot of X and Y is negative? **(E)**

(2) You seek to find P(-3<X<5) and after standardization you look up in the standard normal table P(0.25<Z<0.75). What are the mean and standard deviation of X? **(A)**

(3) Population mean and standard deviation are: **(D)**

(4) Consider taking a multiple choice questions test which consists of 20 questions each with four alternatives. Assume that your choice of the correct answers is purely random. What is your expected score on the test if correct answer earns 1½ points while ½ points is subtracted for incorrect answer? **(B)**

(5) What are parameters of W=X+Y where X and Y are identically and independently distributed uniform random variables, and $\mu_W = 10$ and $\sigma_W^2 = 6$? **(D)**

(6) The weight of oranges is normally distributed. For instance, weight of a navel orange is distributed with mean equal to 300 grams and standard deviation equal to 30, while the average weight of a blood orange is 280 grams with standard deviation equal to 30. If you bought two bags of oranges each containing 25 fruits, what is the chance that the navel bag weighs at least by 400 grams more than the bag of blood oranges? **(D)**

(7) What is the point estimate of the average length of pickles if the 98% confidence interval computed from the sample of size 100 is (11.535, 12.465) and population standard deviation is known to be 2 cm? **(D)**

(8) Random variable W has the following pdf: $f(w)=3-6w$ if $0 \le W \le 0.5$ and $f(w)=2w-1$ if $0.5 < W \le 1$. Find $P(0.25 \le W \le 0.75)$ **(C)**

(9) Which of the following statements about $\overline{X}_A$ and $\overline{X}_B$ is true? **(E)**

(10) Eleven people have been independently exposed to a serious non-infectious disease. Each one has a 40% chance of contracting the disease. The local hospital has the capacity to handle only 7 cases of the disease. What is the probability that the hospital's capacity will be exceeded? **(A)**

(11) Refer to the previous problem. The hospital needs to have enough beds available to handle a proportion of all outbreaks. Suppose, a typical outbreak has 100 people exposed, each with a 40% chance of contracting the disease. Which of the statements below is not correct: **(D)**

(12) A new headache remedy has been given to a group of 25 subjects who had headaches. Four hours after taking the new remedy, 20 of the subjects reported that their headaches had disappeared. From this information you conclude: **(C)**

(13) Now assume that the chance that the headache disappears in 4 hours without any remedy is equal to 20%. What is the probability that among 25 patients one fifth will report that their headaches

disappeared in 4 hours even if all the subjects were given a placebo (a pill without any medicinal components): **(D)**

(14) Which of the following statements about sampling distribution are correct? **(C)**

(15) The average waiting time in the Sydney Smith's Tim Hortons outlet is uniformly distributed between 1 and 7 minutes. What is the chance that a randomly selected student in line has to wait more than 5 minutes? **(D)**

(16) You are investigating the cases of binge drinking[1] among the freshmen class at the Big State University. You have collected information on the drinking patterns for a random sample of 200 first-year male students. You also know that the population standard deviation is equal to 2.5 drinks. You have found that the 98% confidence interval for the mean number of drinks is (3.8, 5.6). You conclude that: **(E)**

(17) To get to his friends' home, Harry needs to change two buses. He knows that the waiting time for the first bus is normally distributed with parameters 4 and 1, and the waiting time for the second bus is normally distributed with parameters 7 and 2. Estimate the chance that Harry's waiting time on his way to his friend's home does not exceed 9 minutes, assuming that the schedules of the two buses are independent. **(B)**

(18) The distribution of Binomial random variable X is positively skewed. Choose a correct statement from below. **(D)**

(19) From the table you conclude that: **(B)**

(20) Find variance of X-Y. **(E)**

 (21) Mario runs a pizza restaurant. The restaurant delivers pizza to locations within 4 km. The delivery time is known to be normally distributed with the mean of 30 minutes and standard deviation of 7.5 minutes. Mario is planning to offer pizza for free if the delivery takes longer than advertized. If Mario wants to limit free pizza orders to 8 percent of the time, how many minutes should he set up for free offer in advertisement? **(E)**

(22) Choose the cases from following under which the Central Limit Theorem does not apply: **(A)**

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[1] Binge drinking is defined as an episodic excessive drinking of consuming five or more drinks by males and four or more drinks by females on one occasion.