

MATH-1110 (DUPRÉ) FALL 2016 TEST 3 ANSWERS

1. PRINT YOUR LAST NAME IN THE UPPER RIGHT CORNER IN LARGE CAPITAL LETTERS.

2. PRINT YOUR FIRST NAME UNDERNEATH YOUR LAST NAME IN THE UPPER RIGHT CORNER IN CAPITAL LETTERS.

3. PRINT YOUR LAB DAY AND LAB START TIME UNDERNEATH YOUR FIRST NAME IN THE UPPER RIGHT CORNER.

4. WRITE YOUR SPRING 2016 MATH-1110 COURSE SECTION NUMBER UNDERNEATH YOUR LAB DAY IN THE UPPER RIGHT CORNER.

The remaining problems all use the information that follows. Suppose that Sam has a pond containing EXACTLY 100 fish, and he knows that the fish in his pond have an average weight of 80 grams with a standard deviation of 12 grams. Joe weighs SIXTEEN fish from Sam's pond, one after another, WITH REPLACEMENT (or, catch and release, in fisherman terminology) but Sam does not see which fish Joe weighs. Joe does not know anything in advance about the weights of the fish in Sam's pond. Of the 100 fish in Sam's pond, 60 are redfish and 40 are bluefish.

5. What should Sam EXPECT is the AVERAGE weight of the SIXTEEN fish Joe weighed?

ANSWER: 80 grams

6. What should Sam EXPECT is the squared error in his expected AVERAGE weight of the SIXTEEN fish Joe weighed?

ANSWER: $(12)^2/16 = (12/4)^2 = 3^2 = 9$

7. If Sam tells Joe that his favorite fish weighs between 50 and 70 grams, but nothing else, what should Joe think is the distribution in weight of that fish, that is what is the name of the distribution?

ANSWER: The Uniform Distribution

8. If Sam tells Joe that his favorite fish weighs between 50 and 70 grams, but nothing else, what is the expected weight of that fish for Joe?

ANSWER: 60 grams

9. If Sam tells Joe that his favorite fish weighs between 50 and 70 grams, but nothing else, what should Joe think is the probability Sam's favorite fish weighs between 55 and 60 grams?

ANSWER: $(60 - 55)/(70 - 50) = 1/4$

10. If Sam decides to catch 20 fish from his pond, how many of these fish does Sam expect will be redbfish?

ANSWER: $(20)(.6) = 12$

11. If Sam decides to catch 20 fish from his pond WITHOUT REPLACEMENT, what is the probability that exactly 11 of the fish turn out to be redbfish?

ANSWER: $C(60, 11)C(40, 9)/C(100, 20)$ or 0.1748329213, either answer acceptable

12. If Sam decides to catch 20 fish from his pond WITH REPLACEMENT, what is the probability that exactly 11 of the fish turn out to be redbfish?

ANSWER: $C(20, 11)(.6)^{11}(.4)^9$ or $.404 - .245 = 0.159$

13. If Joe found that the sample mean for his sixteen fish is 90 grams, and if the sample standard deviation for his sample is 20 grams, then what should Joe think is the MARGIN OF ERROR for his 95 percent confidence interval for the true mean weight of all the 100 fish in the pond, if Joe assumes that the distribution of fish weight in the pond is normal?

ANSWER: $MoE = (2.131)(20)/\sqrt{16} = (2.131)(5) = 10.655$ grams

14. If Joe found that the sample mean for his sixteen fish is 90 grams, and if the sample standard deviation for his sample is 20 grams, then what should Joe think is the MARGIN OF ERROR for his 95 percent confidence interval for the true mean weight of all the 100 fish in the pond, if Joe assumes that the distribution of fish weight in the pond is normal and the population standard deviation is 12 grams because Sam told him so?

ANSWER: $MoE = (1.960)(12)/\sqrt{16} = (1.960)(3) = 5.88$ grams

15. If Joe assumes that the population standard deviation of fish weight in Sam's pond is at most 20 grams, and if he seeks to determine a 95 percent confidence interval with MARGIN OF ERROR at most 5 grams, then how big must the sample size be of his independent random sample of fish from Sam's pond?

ANSWER: $n \geq [(1.960)(20)/5]^2 = [(1.960)(4)]^2 = (7.84)^2 = 61.4656$, so $n \geq 62$

16. If 12 of the SIXTEEN fish Joe caught are redbfish, what should Joe guess is the true proportion of redbfish in Sam's pond, ignoring any margin of error?

ANSWER: $3/4 = .75$ or 75 percent

17. If 12 of the SIXTEEN fish Joe caught are redbfish, what is the MARGIN OF ERROR in the 95 percent confidence interval for the true proportion of redbfish in Sam's pond based on Joe's sample?

ANSWER: $(1.960)(1/2)/\sqrt{16} = 0.245$

18. What should Sam expect is the total weight of the SIXTEEN fish that Joe caught?

ANSWER: $(16)(80) = 1280$ grams

19. What should Sam expect is the standard deviation in the total weight of fish that Joe caught?

ANSWER: $(\sqrt{16})(12) = (4)(12) = 48$

20. If Sam tells Joe that the fish in his pond have average weight 80 grams with a standard deviation of 12 grams, then what should Joe think is the weight of the smallest fish in the top 5 percent weightwise?

ANSWER: $80 + (1.645)(12) = 80 + 19.74 = 99.74$ grams