F 2018 Math 227 FINAL Name: _____

Show your work clearly, neatly, and understandably. Make sure you round the decimal for probability to 5-decimal place and round the percentage to 3-decimal. 110 points available.

1. (15:4,4,7) Let X be the average of Test 1 and Test 2 scores each student in this class and Y be the overall averages right before the Final. A sample of 11 students from a Summer Statistics' class gives the following information.

Sample	X	Y	d = X-Y	d^2
1	55	48		
2	89	84		
3	88	88		
4	89	95		
5	85	81		
6	84	79		
7	100	94		
8	81	68		
9	81	87		
10	83	80		
11	68	60		

a. Find the mean of differences and standard deviation of differences of the sample.

b. Test, at 5%-SL, whether the average of Test 1 and Test 2 scores is greater than the overall average right before the Final. In other words, on average, is X greater than Y?

2. (10:5,5) In this question, you will need to estimate your overall average using your test scores:

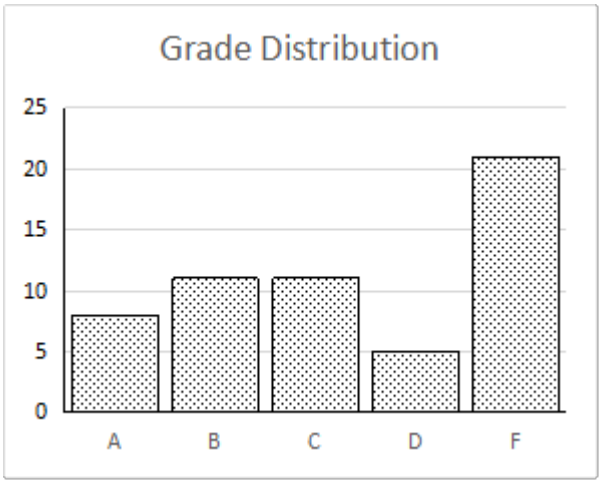
Write your test scores: T1= T2= T3= T4=

a. Find the mean and standard deviation of those test scores:

b. Construct a 95%-CI for your overall average using the result from part (a).

3. (8) The retention rate, that is the ratio of number of students active after Test 3 to number of students registered in week 1, of Thomas' Statistics regular semester classes at ELAC is 38.36%. This summer, his Statistics class at ELAC retains 25 out of 30 students. Test, at 5%-SL, whether the retention rate of his summer class is higher than his Statistics classes in regular semesters.

4. (20:3,6,7,4) The following is the bar-graph of the Grade Distribution of Thomas' Statistics classes at ELAC based on students who were still registered right before the Final. Consider this a population.



a. Construct the Frequency Distribution from the bar-graph.

b. Find the mode, median, Q1, and Q3 from the data-set.

c. Copy the Frequency Distribution in part (a) below and extend to compute the mean and standard deviations of the grade. Note: A=4, B=3, C=2, D=1, and F=0.

d. If 3 students are randomly selected from the data-set, find the probability that at least one got an A.

5. (6:2,4) Let the Grade Distribution in #4 give a precise distribution of students passing Thomas' Statistics class given that student is still registered right before the Final.

a. Find the probability that a student who is still registered right before the Final ended up passing the class, that is getting at least a C.

b. Find the probability that at least 7 out of 10 students who are still registered right before the Final ended up passing the class.

6. (10:2,4,4) From students still registered right before the Final in his Statistics classes at ELAC, it is found that the Grade Distribution after final, X, follows $N(65.5, 20.7^2)$. Suppose we use this info to predict Thomas' Statistics class in Fall 2018.

a. Find the probability that a student still registered right before the Final in Fall 2018 will average more than 80 after Final.

b. Find the probability that 4 students still registered right before the Final in Fall 2018 will average more than 80 after Final.

c. Find the probability that at least 2 out of 4 students still registered right before Final in Fall 2018 will average more than 80 after Final.

7. (14:6,8) The standard deviation of 23 still registered students in this Summer Statistics class is 17.

a. Construct a 99%-CI for standard deviations.

b. Is the standard deviation in this class less than 21? Test at 5%-SL.

8. (9:2,2,5) A confidence interval for population mean was constructed from a sample of size 10 and resulted in $17.6 < \mu < 28.3$. Suppose the population is normally distributed with $\sigma = 7$.

a. Find the sample mean of this sample.

b. Find the margin of error of this confidence interval.

c. Find the confidence level used.

9. (9) Now, we will do comparison between Thomas' Statistics class from Su2017 and Su2014, on the grades right before the Finals:
   Summer 2014: 19 students, mean 71, sd 15
   Summer 2017: 23 students, mean 73, sd 17
   Test at 5%-SL, that the students of these two classes came from populations with the same mean.

10. (9) A random sample of 250 residents in City A consists of 147 college graduates. Another random sample of 200 residents in City B consists of 181 college graduates. Does city B have a higher rate of college graduate compare to City A? Test your claim at $\alpha = 0.03$.