K300 – FINAL REVIEW **Rev. 3/04**

Also review all tests and chapter reviews

1. Select the response that is most appropriate.

   a. A sample of 120 employees of a company is selected, and the average age is found to be 37 years old. This is an example of a
   A) Statistic B) Parameter

   b. The total number of cell phone calls a person makes in a month is 425. This is an example of data that is
   A) Discrete B) Continuous

   c. The temperatures of eight different plastic spheres is an example of data in which of the four levels of measurement.
   A) Nominal B) Ratio C) Ordinal D) Interval

   d. A quality control specialist compares the output from a machine with a new lubricant compared to the output of a machine with the old lubricant. Is this study experimental or observational?
   A) Experimental B) Observational

   e. An education researcher randomly selects 48 middle schools and interviews all the teachers at each school. Identify which type of sampling is used.
   A) Systematic B) Random C)Stratified D)Convenience E) Cluster

   f. Are the following two events independent or dependent.
   1. You cook your chicken improperly 2. You get salmonella poisoning
   A) Independent B) Dependent

   a. Determine whether the given procedure results in a binomial distribution. Rolling a fair die 100 times and keeping track of the "threes" rolled.
   A) Binomial B) Not Binomial

   b. Which of the following distributions are bell shaped and symmetrical?
   A) Uniform Distribution B) Normal Distribution

   I Which of the following distributions have the same probability for every random variable x?
   A) Uniform Distribution B) Standard Normal Distribution

   J Which of the following distributions have a mean of zero and a standard deviation of one?
   A) Normal Distribution B) Standard Normal Distribution

2. In a game, you have a 1/34 probability of winning $91 and a 33/34 probability of losing $9. What is your expected value?

3. Visitors to Yellowstone National Park consider an eruption of the Old Faithful geyser to be a major attraction that should not be missed. The given frequency table summarizes a sample of times (in minutes) between eruptions. A) Find the class width. B) List each of the following: lower class limits, upper class limits, class midpoints, and class boundaries. C) Construct a relative and a cumulative frequency table.

TIME	FREQUENCY
40-49	8
50-59	44
60-69	23
70-79	6
80-89	107
90-99	11
100-109	1

4. The given frequency table describes the speeds of drivers ticketed by the Town of Poughkeepsie police. Those drivers were traveling through a 30 mi/h speed zone on Creek Road, which passes the author's college. Find the mean and the standard deviation. What does the distribution suggest about the enforced speed limit compared to the posted speed limit?

SPEED	FREQUENCY
42-43	14
44-45	11
46-47	8
48-49	6
50-51	4
52-53	3
54-55	1
56-57	2
58-59	0
60-61	1

5. Construct a frequency table with 5 classes with the data given below:
30, 3, 4, 12, 29, 15, 23, 25, 7, 5, 10, 26, 26, 17, 18, 8, 11, 20, 22, 21

6. Nitrate deposits (in kg per hectare) as part of acid rain for Massachusetts from July through September for recent years (based on data from the U. S. Department of Agriculture) follow:
6.40 5.21 4.66 5.24 6.96 5.53 8.23 6.80 5.78 6.00 5.41
Find the (a) mean, (b) median, (c) mode, and (d) midrange for the sample data.
Also find the (e) range, (f) variance, and (g) standard deviation

7. Use the calculator to construct a histogram with the data of problem 3. Specify the window values used.

8. The Beanstalk Club is limited to women and men who are very tall. The minimum height requirement for women is 70 inches. Women's heights have a mean of 63.6 in. and a standard deviation of 2.5 in. Find the z-score corresponding to a woman with a height of 70 in. And determine whether that height is unusual.

9. In a certain test the mean for the class was 87.5 with a standard deviation of 3.1. What is the score corresponding to a z-score of -2.5.

10. Use the data from problem 5 to find each of the following:
a) the percentile corresponding to 20, b) Q_1, c) P_{16}

11. In "Ages of Oscar-Winning Best Actors and Actresses" (Mathematics Teacher magazine) by Richard Brown and Gretchen Davis, boxplots are used to compare the ages of actors and actresses at the time they won Oscars. The results for 34 recent winners are listed. Use boxplots to compare the two data sets.

ACTORS: 32 37 36 32 51 53 33 61 35 45 55 39 76 37 42 40 32
60 38 56 48 48 40 43 62 43 42 44 41 56 39 46 31 47

ACTRESSES: 50 44 35 80 26 28 41 21 61 38 49 33 74 30 33 41 31
35 41 42 37 26 34 34 35 26 61 60 34 24 30 37 31 27

In exercises 12 and 13:
(A) Construct a scatter diagram.
(B) Find the value of the linear correlation coefficient r
(C) Determine whether there is a significant linear correlation between the 2 variables
(D) If the relationship is significant, write the regression equation.
(E) Predict the value of y for the given x.

12. When bears were anesthetized, researchers measured the distance (in inches) around their chest and they weighed the bears (in pounds). The results are given below for eight male bears.

X Chest (in.)	26	45	54	49	41	49	44	19
Y Weight (lb.)	90	344	416	348	262	360	332	34

Find the best predicted weight of a bear with a chest size of 52 in.
Do the results change if the chest measurements

16. To settle a paternity suit, two different people are given blood tests. If X is the number having group A blood, then X can be 0, 1, or 2 and the corresponding probabilities are 0.36, 0.48, and 0.16, respectively (based on data from the Greater New York Blood Program). Find the mean, variance, and standard deviation.

17. A 27 year old woman decides to pay $156 for a one-year life-insurance policy with coverage of $100,000. The probability of her living through the year is 0.9995 (based on data from the U. S. Department of Health and Human Services and AFT Group Life Insurance). What is her expected value for the insurance policy?

18. Assume that male and female births are equally likely and that the birth of any child does not affect the probability of the gender of any other children. Find the probability of
(A). Exactly 4 girls in 10 births.
(B). At least 4 girls in 10 births.
(C). Exactly 8 girls in 20 births.

19. Mars, Inc., claims that 20% of it's plain M&M candies are red. Find the probability that when 15 plain M&M candies are randomly selected, exactly 20% (or 3 candies) are red.

20. Letter frequencies are analyzed by the Central Intelligence Agency in an attempt to decipher intercepted messages. In standard English text, the letter e occurs with a relative frequency of 0.130.
(A). Find the mean and standard deviation for the number of times the letter e will be found on standard pages of 2600 characters.
(B). In an intercepted message sent to Libya, a standard page of 2600 characters is found to have the letter e occurring 307 times. Is this unusual?

21. Assume that the readings on the thermometers are normally distributed with a mean of 0 and a standard deviation of 1.00. A thermometer is randomly selected and tested. In each case, draw a sketch, and find the probability of each reading in degrees.
(A) Greater than 2.58
(B) Between -2.22 and -1.11
(C) Between -1.00 and 4.00
(D) Find P_{90}, the 90th percentile. This is the temperature reading separating the bottom 90% from the top 10%.
(E) If 2.5% of the thermometers are rejected because the readings are too low, find the cut off temperature for the rejected thermometers

22. According to the Opinion Research Corporation, men spend an average of 11.4 min in the shower. Assume that the times are normally distributed with a standard deviation of 1.8 min. If a man is randomly selected, find the probability that he spends at least 10.0 min in the shower.

23. IQ scores are normally distributed with a mean of 100 and a standard deviation of 15. If we define a genius to be someone in the top 1% of IQ scores, find the score separating geniuses from the rest of us. This score could be used by a "think tank" company as one criterion for employment.

24. For women aged 18-24, systolic blood pressures (in mm Hg) are normally distributed with a mean of 114.8 and a standard deviation of 13.1 (based on data from the National health Survey).
(A) If a woman between the age of 18-24 is randomly selected, find the probability that her systolic blood pressure is greater than 120.
(B) If 12 women in that age bracket are randomly selected, find the probability that their mean systolic blood pressure is greater than 120.
(C) Given that part (B) involves a sample size that is not larger than 30, why can the central limit theorem be used?

25. The lengths of pregnancies are normally distributed with a mean of 268 days and a standard deviation of 15 days.
(A) If 1 pregnant woman is randomly selected, find the probability that her length of pregnancy is less than 260 days.
(B) If 25 randomly selected women are put on a special diet just before they become pregnant, find the probability that their lengths of pregnancy have a mean that is less than 260 days (assuming that the diet has no effect).
(C) If the 25 women do have a mean of less than 260 days, should the medical supervisors be concerned?

26. The National Center for Education Statistics surveyed 4400 college graduates about the lengths of time required to earn their bachelor's degrees. The mean of the sample is 5.15 years. It is known that the population standard deviation is 1.68 years. Construct the 99% confidence interval for the mean time required by all college graduates.

27. A psychologist has developed a new test of spatial perception, and she wants to estimate the mean score achieved by male pilots. How many people must she test if she wants the sample mean to be in error by no more than 2.0 points, with 95% confidence? An earlier study suggest that s=21.2.

28. In crash test of 15 Honda Odyssey minivans, collision repair cost are found to have a distribution that is roughly bell shaped, with a mean of $1786 and a standard deviation of $937 (based on data from the Highway Loss Data Institute). Construct the 99% confidence interval for the mean repair cost in all such vehicle collisions.

29. A reporter for Byte magazine wants to conduct a survey to estimate the true proportion of all college students who own personal computers, and she wants 95% confidence that her results have a margin of error of 0.04. How many college students must be surveyed?
(A) Assume that we have an estimate of p-hat found from a prior study which revealed a percentage of 27% (based on data from the American Passage Media Corporation).
(B) Assume that we have no prior information suggesting a possible value of p-hat.

30. In doing market research for the Ford Motor Company, you find that a random sample of 1220 households includes 1054 in which a vehicle is owned (based on data from the Bureau of the Census). Based on those results, construct a 98% confidence interval for the percentage of all households in which a vehicle is owned.

31. The effectiveness of a test preparation course was studied for a random sample of 75 subjects who took the SAT before and after coaching. The differences between the scores resulted in a mean increase of 0.6. σ is known to be 3.8. At the 0.05 significance level, test the claim that the population mean increase is greater than 0, indicating that the course is effective in raising scores. Should people take this course?

32. For each of 12 organizations, the cost of operation per client was found. The 12 scores have a mean of $2133 and a standard deviation of $345. At the 0.01 significance level, test the claim of a stockholder who complains for all such organizations exceeds $1800 per client. (Assume a normal distribution.)

33. A television executive claims that "fewer than half of all adults are annoyed by the violence shown on television." Test this claim by using sample data from the Roper poll in which 48% of 1,998 surveyed adults indicated their annoyance with television violence. Use a 0.05 significance level.

Answers to Final Review Questions ... hopefully with minimal typos!!

1-a)A, b) A, c) D, d) A, e) E, f) B, g) A, h) B, I) A, j) B
2. -$6.06
3-A) 10, B) Lower class limits : 40, 50, 60, 70, 80, 90, 100. Upper class limits: 49, 59, 69, 79, 89, 99, 109. Class midpoints: 44.5, 54.5, 64.5, 74.5, 84.5, 94.5, 104.5. Class boundaries: 39.5, 49.5, 59.5, 69.5, 79.5, 89.5, 99.5, 109.5, C) Relative frequencies: .04, .22, .115, .03, .535, .055, .005. Cumulative frequencies: 8, 52, 75, 81, 188, 199, 200.
4. mean = 46.7, standard dev. = 4.3.... The posted speed limit is not being kept!!
5.

	FREQUENCY
3-8	5
9-14	3
15-20	4
21-26	6
27-32	2

6. a) 6.020; b) 5.780; c) none; d) 6.445 ; e) 3.570; (f) 1.030; (g) 1.015
7. x-window: [39.5,109.5], y-window: [-10,109], x-scale = 10.
8. 2.56 - unusual
9.79.75
10A) 55th B) 9 (C) 7
11. Actors: 5-summary values: 31, 37, 42.5, 51, 76
Actresses: 5-summary values: 21, 30, 35, 42, 80
12. B) .993 = r; c) C.V. = .707, significant linear correlation, d) y = 11.3x-187, e) 400.6 lb
13. B) .127 = r; c) C.V. = .707; there is NO correlation, e) 3.3
14. .320
15. .290
16. Prob. Distribution, mu = 0.8, variance - 0.5 std. Dev = 0.7
17. - $106
18. A) 0.205 B) 0.828 C) .120
19. 0.250
20. a) mean = 338.0; std dev = 17.1 b) No
21. A) .0049 B) .1203 C) .8412 D) 1.28 degrees E) –1.96
22. .7823
23. 135
24. A) .3446 B) .0838 C) because original population has normal distribution
25. A) .2981 B) .0038 C) Yes, highly unlikely
26. 5.08 < mu < 5.22
27. 432
28. $1066 < mu < $2506
29. A) 474 B) 601
30. 84.1% < p < 88.7%
31. C.V. z = 1.645; T.S. z = 1.37 p = .0853
32. C.V. T = 2.718 T.S.: T= 3.344
33. C.v. Z = -1.645 t.s.: Z = -1.79 P = .0367