Name: _____
Student No.: _____

University of Alberta

Department of Mathematical and Statistical Sciences

Statistics 151 Midterm Examination Version A

Date: February 27, 2009

Instructor (circle): Alireza Simchi

Time: 9:00-10:50

Instructions: (READ ALL INSTRUCTIONS CAREFULLY.)

1. This is a closed book exam. You are permitted to use a non-programmable calculator. Please turn off your cellular phones or pagers.

2. The exam has 20 multiple-choice questions. For each multiple-choice question choose the answer that is closest to being correct. Circle one of the letters (a)-(j) corresponding to your chosen answer for each question. All answers will be graded right or wrong (no partial credit) in this part. Each single question is worth 1 point. All numerical answers are rounded.

3. This exam has **4** pages including this cover. Please ensure that you have all pages and write your name and your student ID at the top of each page.

4. The table of the standard normal probabilities and formula sheet are provided in a separate booklet.

5. The exam is graded out of a total of **20** points.

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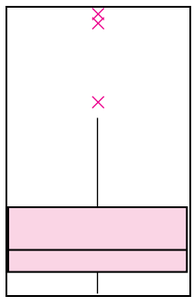
1. A study from hospital records found that women who had low weight gain during their pregnancy were more likely to have low birth weight babies than women who had high weight gains. Which of the following sentences is true?

(a) The study is an experiment,
(b) The study is an observational study,
(c) The study is neither an observational study nor experiment,
(d) The data obtained is sufficient to evaluate the effect of the pregnant women's weight on the weight of birth weight babies.
(e) None of the above can be concluded based on the information provided.

2. Which one of the following statements is true, regarding the box plot given below?

(a) The mean is greater than the median.
(b) The mean is less than the median.
(c) The mean is approximately equal to the median.
(d) (d) Box plot is incorrectly drawn.
(e) (e) Impossible to determine as there isn't sufficient information.



3. A vendor converts the weights on the packages she sends from pounds to kilograms. (1 Kg ≈2.2 lb). The mean weight of the package was 22 lb with standard deviation of 0.22 lb. Which among the following statements is correct? After repackaging,

(a) The new standard deviation is 10,

(b) The new standard deviation is 1.065,

(c) The new standard deviation is 0.484,

(d) The new standard deviation is 0.045,

(e) The new standard deviation is 0.1.

4. The following given is the information on a data set of 24 points.

Min	Q1	Q2	Q3	Max
9.0	15.0	16.5	18.0	22.0

Based on the 1.5 IQR rule, which of the following statement is TRUE?

(a) There are no outliers in this data

(b) 22.0 is an outlier,

(c) 9.0 is an outlier,

(d) Both 9.0 and 22 are outliers,

(e) There isn't sufficient information to determine the outliers.

5. A process manufactures crank shaft journal bearings for an internal combustion engine. In a sample of size 12, it was noticed that 3 of the bearings had thickness of 1.48mm, 3 had thickness of 1.49mm and 6 had thickness 1.50mm. What is the inter-quartile range for the data?

(a) 0.015 (b) 0.150 (c) 0.005 (d) 0.025 (e) 0.035

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6. A random sample of 150 adult male residents of Saskatchewan was obtained as part of a study of smoking habits of people in the province. Each sampled male provided information regarding the level of education he had achieved and his smoking habits. The information is summarized in the following table.

		Smoking Habit	
		Smoker	Non-smoker
College Graduate	Yes	25	40
	No	55	30

If a male person is selected at random from the above sample, what is the probability that he is a non-smoker?

(a) 0.27 (b) 0.43 (c) 0.47 (d) 0.53 (e) 0.57

7. Refer to question 6; if a male person is selected at random, what is the probability that he is a non-smoker given that he is a college graduate?

(a) 0.312 (b) 0.385 (c) 0.571 (d) 0.615 (e) 0.688

8. The random variable X has the following probability distribution.

Value of X	-2	-1	0	1	2
Probability	0.1	0.3	?	0.2	0.1

What is $P(-1 \le X < 1)$?

(a) 0.4 (b) 0.5 (c) 0.6 (d) 0.7 (e) 0.8

9. Refer to question 8; what is the mean of X or $\mu_X = E(X)$?

(a) -0.2 (b) -0.1 (c) 0.0 (d) 0.1 (e) 0.2

10. The mean height of American women in their twenties is about 64 inches, and the standard deviation is about 2.7 inches. The mean height of men the same age is about 69.3 inches with standard deviation about 2.8 inches. Suppose correlation between the heights of husbands and wives is about r =0.5. What is the intercept of the least squares regression line?

(a) 34.74 (b) 36.02 (c) 37.30 (d) 38.58 (e) 39.86
(f) 47.54 (g) 48.82 (h) 50.10 (i) 51.38 (j) 52.66

11. A scientist is studying the relationship between X= inches of annual rainfall and Y= inches of shoreline erosion. The following table shows the results of her study.

X	30	25	90	60	50
Y	0.30	0.2	4.5	3.0	2.0

What is the slope of the regression line of Y on X?

(a) -0.069 (b) -0.991 (c) -1.544 (d) -2.632 (e) 14.130
(f) 0.069 (g) 0.991 (h) 1.544 (i) 2.632 (j) 22.750

12. Refer to question 11; what proportion of variation in Y is explained by the regression model of Y on X?

(a) 0.02 (b) 0.16 (c) 0.28 (d) 0.35 (e) 0.41
(f) 0.51 (g) 0.68 (h) 0.74 (i) 0.82 (j) 0.98

13. Refer to question 11; what is the sample variance of annual rainfall?

(a) 1.829 (b) 2.045 (c) 3.345 (d) 4.182 (e) 5.629
(f) 26.077 (g) 29.155 (h) 550 (i) 680 (j) 850

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14. Suppose the probability that an American has traveled to Canada is 0.28, to Mexico is 0.17, and to both countries is 0.05. What is the probability that an America selected at random has not traveled to either country?

(a) 0.1 (b) 0.2 (c) 0.3 (d) 0.4 (e) 0.5
(f) 0.6 (g) 0.7 (h) 0.8 (i) 0.9 (j) 1.0

15. Let A and B be events with $P(A) = 0.3$ and $P(A \cup B) = 0.7$. For what value of $P(B)$ will A and B be disjoint?

(a) 0.1 (b) 0.2 (c) 0.3 (d) 0.4 (e) 0.5
(f) 0.6 (g) 0.7 (h) 0.8 (i) 0.9 (j) 1.0

16. A factory produce resistors whose resistance are normally distributed with mean 10Ω and standard deviation of 1Ω. What is the proportion of resistors whose resistances are between 9.3 Ω and 10.7 Ω?

(a) 0.116 (b) 0.216 (c) 0.316 (d) 0.416 (e) 0.516
(f) 0.193 (g) 0.293 (h) 0.393 (i) 0.493 (j) 0.593

17. A factory produce resistors whose resistance are normally distributed with mean 10Ω and standard deviation of 1Ω. If a sample of 100 resistors is selected, what is the probability that 50 or more of them will have resistances between 9.3 Ω and 10.7 Ω?

(a) 0.1 (b) 0.2 (c) 0.3 (d) 0.4 (e) 0.5
(f) 0.6 (g) 0.7 (h) 0.8 (i) 0.9 (j) 1.0

18. An anthropologist wishes to estimate the average height of men for a certain race of people. If the population standard deviation is assumed to be 2.5 inches and if she randomly samples 100 men, what is the probability that the difference between the sample mean and the true population mean will exceed 0.5 inch.

(a) 0.0228 (b) 0.0456 (c) 0.0918 (d) 0.1814 (e) 0.2420
(f) 0.7580 (g) 0.8186 (h) 0.9082 (i) 0.9544 (j) 0.9722

19. The distribution of net typing rate in words per minute (wpm) for experienced typists can be approximated by a normal curve with mean 60 wpm and standard deviation 15 wpm. Suppose that special training is to be made available to the slowest 20% of the typists. What typing speeds would qualify individuals for this training?

(a) 4.2 wpm (b) 40.2 wpm (c) 47.4 wpm (d) 52.4 wpm (e) 54.6 wpm
(f) 60.5 wpm (g) 68.7 wpm (h) 72.6 wpm (i) 82.9 wpm (j) 84.0 wpm

20. A 1998 census recorded that 20% of families in Old Montreal lived below the poverty level. Assuming the 20% figure is still correct today, and a random sample of 800 families is selected from this community, what is the probability that less than 170 families in the sample live below the poverty level?

(a) 0.9987 (b) 0.9938 (c) 0.9722 (d) 0.8413 (e) 0.8106
(f) 0.0013 (g) 0.0062 (h) 0.0228 (i) 0.1587 (j) 0.1894