

Howard University
Department of Mathematics

Comprehensive Final (Spring 2006) Wednesday, May 3rd, 2006.

Introduction to Statistics

Name: _____
(Please **PRINT** your name)

Signature: _____

I.D. # _____

Show all work otherwise NO POINTS WILL BE AWARDED. All work must be neat and legible OTHERWISE POINTS WILL BE DEDUCTED. Partial credits will be given for work which demonstrates a working knowledge of the concepts.

Answer all questions. Each question is worth 25 points. (Exam will be graded out of 200 points. Your score will then be divided by 2 then 30% of this figure will go towards your final grade. Note that there is one bonus question).

Do not write in the columns below.

Question 1			Question 7	
Question 2			Question 8	
Question 3			Question 9	
Question 4				
Question 5			Comprehensive Final Exam Total	
Question 6			Comprehensive Final Exam Grade	
			Course grade	

Q1)

(a) Using the data set: 25, 32, 35, 18, 42, 39, 71, 29, 40, 19, 54, 12, 48, and 68:

(i) find the value that corresponds to the 76th percentile.

(ii) find the percentile rank for the value 54.

(b) A list of the 60 most powerful women in America was published. The average age of these women was 48 years old with a standard deviation of 6.10 years. Using Chebyshev's Theorem, what is the range of ages in which at least 60% of the data lie?

Q2) The distribution on a Mathematics Test was obtained and the results are shown on the table below.

Complete the table and find the mean, median, modal class, variance, and standard deviation for the data:

Class Limits	Frequency f	Class Boundaries	Midpoints X_m	$f \cdot X_m$	Cummulative Frequency	$f \cdot X_m^2$
46 - 56	6					
57 - 67	9					
68 - 78	18					
79 - 89	8					
90 - 100	7					

Q3)

(a) The table below shows the average grades and degrees for graduates.

DEGREE	GRADES			TOTAL
	C	B	A	
B.S	12	20	14	
B.A	16	14	12	
TOTAL				

Complete the table. If a graduate is selected at random, find the probability that:

(i) The graduate has a B.A. degree given that he or she has an A average.

(ii) Given that the graduate has a B.S. degree, he or she has a B average.

(b) Find the 95% confidence interval for the variance and standard deviation of the nicotine content of cigarettes manufactured if a sample of 20 cigarettes has a standard deviation of 1.6 milligrams. (*Use the Chi-Square Distribution*).

Q4) A sales person from an auto dealership knows from past experience that, on the average, she will make a sale to 18% of her customers. What is the probability that, in 10 random selected presentations, she makes a sale to:

- (i) Exactly 6 customers.
- (ii) At most one customer.
- (iii) At least one customer.

(*Hint: Use the Binomial Distribution*)

Q5)

(a) Of the members of a bowling league, 10% are widowed. If 200 bowling league members are selected at random, find the probability that less than 24 or more will be widowed. [*Use the normal approximation to the binomial distribution by first showing the test that this approximation can be used*]

(b) The average weight of young adult males is 160 pounds. The standard deviation is 10 pounds. If a sample of 28 people is selected from the population of 300, find the probability that the mean for the sample will be more than 156 pounds. [*Show details with conclusion whether the correction factor is to be used*].

Q6)

(a) A publisher wants to publish home improvement books. After a survey of the market, the publisher finds that the average price for this type of book is \$40. with a standard deviation of \$1.10. The publisher wants to target the middle 34% of the market. What should be minimum and maximum prices for the book assuming the variable is normally distributed?

(b) In an automobile service shop, the supervisor timed 8 employees and found that the average time it took them to change a tire was 24 minutes. The standard deviation of the sample was 3 minutes. Using the t-distribution, find the 99% confidence interval of the true mean.

Q7) Research at Florida State University was carried out to determine the effects of alcohol on the reactions of people to threat of electric shock. The “startle” response time for each subject was measured in milliseconds (ms) from which the mean was 37.9 ms and the standard deviation was 12.4 ms. Assuming the variable (blood alcohol level) is normally distributed:

- i. Find the probability that the response time is between 40 ms and 50 ms.
- ii. Find the probability that the response time is less than 35ms.
- iii. What is the cut off response time for the highest 10% of the subjects?

Q8)

In an appliance study of 100 toasters, a manufacturer found that the average lifetime was 18 months. The standard deviation was 5 months. If 22 toasters were selected, find the probability that the mean lifetime of the sample will be more than 16 months. Assume the variable is normally distributed. *(Hint: Show full details of test with conclusion whether the correction factor is needed).*

Q9)

In a corporation, 30% of the people elect to enroll in the investment program offered by the company. Find the probability that of the 800 randomly selected people, at least 260 have enrolled in the investment program. *(Hint: Show full details with conclusion whether the Normal Approximation to the Binomial Distribution can be used).*