MA 180/418 Midterm Test 3, Version A Spring 2011

Student Name (PRINT):.....

Student Signature: .....

The test consists of 10 questions.
Questions 1 through 5 are multiple-choice and worth 5 points each.
Questions 6 through 10 are computational and worth 15 points each.

For questions 1 through 5, circle the correct answer (**a**, **b**, **c**, or **d**) after each question. Each question is 5 points. No partial credit.

Q1 Which statement about the **F-distribution** is correct?

(a) It is a symmetric distribution.

(b) It cannot be negative and its exact shape depends on the number of degrees of freedom.

(c) It cannot be negative and its exact shape depends on two degrees of freedom.

(d) It cannot be negative and its exact shape depends on three degrees of freedom.

Correct answer (circle one): (a) (b) (c) (d)

Q2 Which statement is correct about **independent samples** and **dependent (matched-pair) samples**?

(a) When two independent samples are paired, they become dependent samples.

(b) Independent samples are taken independently from one population.

(c) In dependent samples, each value in the first sample is naturally paired with another value from the same first sample.

(d) In dependent samples, each value in the first sample is naturally paired with another value from the second sample.

Correct answer (circle one): (a) (b) (c) (d)

Q3 Which statement is correct about **predictor variable** and **response variable**?

(a) The predictor variable x is independent variable and the response variable y is dependent variable.

(b) The predictor variable y is independent variable and the response variable x is dependent variable.

(c) The predictor variable x is dependent variable and the response variable y is independent variable.

(d) The predictor variable y is dependent variable and the response variable x is independent variable.

Correct answer (circle one): (a) (b) (c) (d)

Q4 Which statement is correct about **regression line** and **regression equation**?

(a) The regression line separates the x variable from the y variable.

(b) The regression line is the graph of the correlation between the x variable and the y variable.

(c) The regression equation describes the relation between two variables in algebraic form.

(d) The regression line describes the relation between two variables in algebraic form.

Correct answer (circle one): (a) (b) (c) (d)

Q5 Which statement is correct about **goodness-of-fit test**?

(a) It is used to test the hypothesis that observed frequencies are equal to the expected frequencies.

(b) It is used to test the hypothesis that observed frequencies are greater than the expected frequencies.

(c) It is used to test the hypothesis that observed frequencies are less than the expected frequencies.

(d) It is used to test the hypothesis that observed frequencies fit the expected frequencies.

Correct answer (circle one): (a) (b) (c) (d)

For questions 6 through 10, write your answer in the space provided. Show your work. Each question is worth 15 points.

Q6 In a 2009 survey of 756 college students, 144 said they used illegal drugs. In a 2010 survey of 566 college students, 133 said they used illegal drugs.

(a) Construct an 80% confidence interval for the difference between proportions of college students using illegal drugs in 2009 and 2010. (Round off the confidence limits to **three** decimal places.) If you use technology, name the respective software or the calculator function.

(b) Does it appear that the proportion of college students using illegal drugs has changed since 2009? Why or why not?

Q7 A statistician collected a random sample of the cents portion from 40 checks and from 55 credit card charges. The cents portions of the checks have a mean of 57 cents and a standard deviation of 24 cents. The cents portions of the credit card charges have a mean of 48 cents and a standard deviation of 38 cents. Use a 0.1 significance level to test the claim that the cents portions of the checks have a mean that is greater than the mean of the cents portions of the credit card charges.

(a) State the null and the alternative hypotheses.

(b) Compute the test statistic. (Round off to **three** decimal places.)

(c) Draw a diagram. Find and mark the critical value(s).

(d) Make an initial conclusion and a final conclusion.

[Bonus] Find the P-value of the test (round off to **four** decimal places). Or use a table to determine an interval for the P-value. Make a conclusion by using the P-value.

Q8 Listed below are the measurements of the blood pressure of six subjects taken on their right arm and left arm. Use a 0.02 significance level to test for a difference between the measurements from the two arms.

Right arm:	112	106	101	99	104	98
Left arm:	125	103	102	109	103	104

(a) State the null and the alternative hypotheses.

(b) Compute the test statistic. (Round off to **three** decimal places.)

(c) Draw a diagram. Find and mark the critical value(s).

(d) Make an initial conclusion and a final conclusion.

[Bonus] Find the P-value of the test (round off to **four** decimal places). Or use a table to determine an interval for the P-value. Make a conclusion by using the P-value.

Q9 Listed below are the measurements of the blood pressure of six subjects taken on their right arm and left arm. Use the pressure in the right arm as the x variable and the pressure in the left arm as the y variable.

Right arm:	112	106	101	99	104	98
Left arm:	125	103	102	109	103	104

(a) Find the linear correlation coefficient. (Round off to **three** decimal places.)

(b) Use 0.05 significance level to test the hypothesis that there is a linear correlation between x and y. Write down the critical value. Make the conclusion.

(c) Find the equation of the regression line. (Round off the regression coefficients to **four** decimal places.)

Q10 Use the data from the previous question, Q9, to compute the predicted blood pressure in the left arm given that the blood pressure in the right arm is 100. Follow these steps:
(a) Compute the predicted blood pressure by using the regression equation. (Round off to **one** decimal place.)

(b) Compute the predicted blood pressure by using y-bar.(Round off to **one** decimal place.)

(c) Find the best predicted blood pressure. Explain which rule you use.