

**Spring 2009,
Final Exam - Info Sheet**

The Final Exam is
on Thursday, May 7, 2009

Section 1 (Prof Sellke) in CLAS 108

Section 2 (Prof Savkar) in ITE C 80

From 10:30 AM - 12:30 PM.

There are no makeup exams for this class during this semester. If you have permission from the dean of students to make adjustments to your exam schedule, and you have not been able to make adjustments with other courses, you will be allowed to make up the final exam for Math 1070 in the coming Fall 2009. You will be responsible to check with the Department of Mathematics office for the exact dates and time of the make up exam in the Fall semester.

Content and Structure: The exam will be cumulative. Approximately 20% of the final will be on topics covered since Exam 2 (matrices). Approximately half of the remaining questions will come from topics covered before Exam 1 and half from topics covered before Exam 2. About 40% of the exam will be multiple choice questions. These questions will have no partial credit. The remaining problems will be similar to the types seen on the first two exams. **This is just an estimate of the general structure of the exam. Changes to this structure are completely at the discretion of the instructors.**

The finance formula sheet and z -score tables from Exam 2 will be included with the final. The linear regression formulas will also be given to you. You are responsible for all other necessary formulas and equations. You may have a graphing calculator as described in the syllabus, but no other technology and no notes or books.

Review Materials: A new set of practice problems has been posted; solutions will eventually be posted. After doing these problems, next look at the old exams and make sure that you can do those problems. The students are encouraged to make sure to go through the review packets for the previous two exams, home work problem on WA, and any material covered in the class.

Math 1070: Practice Problems for Final Exam

Warning: This is an attempt to help you study and is not meant to be representative of everything that will appear on the final. Topics on the final may be missing from this review sheet and topics here may not appear on the final. These are merely a sampling of problems from some of the main topics in the class. In addition, there might be typos and/or mistakes.

1. How much will \$10,000 in a savings account for 4 years at 4% annual interest compounded semiannually grow to? **(Pick the closest answer)**

a) \$11200

b) \$11700

c) \$12200

d) \$11800

2. MATH INC must form a bargaining committee of 6 members to negotiate a new contract with the American Mathematical Society. The chair and secretary must be chosen from the 12 board members and the other four must be chosen from the 10 senior non-board members. In how many ways can this be done?

a) 53721360

b) 13860

c) 665280

d) 27720

e) 74613

3. If the following augmented matrix $\left[\begin{array}{ccccc|c} 1 & 2 & 1 & -1 & 0 & 0 \\ 0 & 2 & 2 & 4 & 2 & -4 \\ 0 & 3 & 3 & 5 & 3 & -5 \end{array} \right]$ comes up in your calculation while trying to solve a system of linear equations, what can you say about the number of solutions to the corresponding system of equations?

a) There is one unique solution.

b) There are infinitely many solutions.

c) There are no solutions.

d) Cannot be determined from the information given.

4. A savings account pays interest at a the annual rate of 1.05%, compounded monthly. What is the effective rate of interest?

a) 19.56%

b) 1.05%

c) 1.05414%

d) 1.05507%

e) 3.19588%

5. A 350-seat movie theater charges \$8.50 admission for adults and \$5.50 for children. If the theater is full and \$2711 is collected, how many adults and how many children are in the audience? Use the inverse of a matrix to solve the resulting system.

6. Consider the following systems of equations. Solve the system using the following two methods.

$$\begin{array}{rcrcrcrcrcl} x & + & 2y & + & 3z & = & 4 \\ & & 4y & + & 8z & = & 12 \\ 3x & + & 9y & + & 18z & = & 18 \end{array}$$

- (a) Solve using an augmented matrix and Gaussian elimination. You must **clearly** indicate all row operations you use and the final solution to the system of linear equations.
- (b) Write the system in the form $AX = B$ and solve using the inverse of a matrix. Find the inverse using the Gauss-Jordan method. You must **clearly** indicate all row operations you use and the final solution to the system of linear equations.
7. (a) Graph the feasible region of the following linear system of inequalities. Find all corner points. **Show all your work**
- $$\begin{array}{l} 5y + 6x \geq 85 \\ 5y - 2x \geq 5 \\ 10y + 4x \leq 130 \\ x, y \geq 0 \end{array}$$
- (b) Given the feasible region above, find the maximum value of $Z = 7x + 5y$.
8. Twenty athletes enter an Olympic event. How many different possibilities are there for winning the gold, silver, and bronze medals? **Show all work to get any credit. Only answers will not get any points, even if they are correct**
9. In how many ways can 12 jurors and 2 alternates be chosen from a group of 20 prospective jurors? **Show all work to get any credit. Only answers will not get any points even if they are correct**
10. Four cards are drawn from an unbiased deck of 52 cards. What is the probability that there are two red and two black cards?
11. Find the probability of obtaining exactly three heads when tossing a fair coin six times.
12. The amount of soda in a 16-ounce can is normally distributed with a mean of 16 ounces and a standard deviation of 0.5 ounces. What percentage of cans will have
- (a) less than 15 ounces?
- (b) more than 17.5 ounces?
- (c) between 15 and 17.5 ounces?
13. An urn contains 6 white balls and 10 red balls. A sample of six balls is selected at random from the urn.
- a) What is the probability that the sample has 3 white and 3 red balls?
- b) What is the probability that the sample has at least 2 red balls?

14. Company X, Y and Z produce 30%, 30%, 40% of the semi conductors in a certain region, respectively. A study shows that 4% of the semi-conductors from company X are defective, 3% from company Y are defective, and 2% of those from company Z are defective. Draw the tree diagram with all the relevant probabilities. What is the probability that a randomly drawn semi conductor is from Company Z given that it is defective?
15. A company finds that one out of every ten workers it hires turns out to be unsatisfactory. Assume that the satisfactory performance of any hired worker is independent of that of any other hired worker. If the company will hire 20 people next year, what is the probability that at least 18 of them will be satisfactory?
16. The supply curve for a certain commodity is the straight line whose equation is $p = 0.1x + 300$, where p is the price per ton in dollars and x is the quantity in tons sold per month. The manufacturing company can sell 900 tons of the commodity each month if the price is \$460 per ton, but only 500 tons if the price is \$700 per ton.
- (a) Assuming that the demand curve is a straight line, find its equation in slope-intercept form.
 - (b) Determine both the quantity (in tons) of the commodity that will be produced per month and the price (per ton) at which it will sell once the market has reached equilibrium.
17. A gerbil at a pet shop is to be fed certain amounts of Food I and Food II, and its health requires that it have at least 30 grams of protein and 20 gm of fat per feeding. Each unit of Food I costs 15 cents and provides 2 gm of protein and 4 gm of fat while each unit of Food II costs 10 cents and provides 6 gm of protein and 2 gm of fat. Food II is being bought under a contract requiring that at least one unit of Food II be used per feeding. Determine how many units of each type of food the shop must buy to provide the gerbil a healthful diet at minimum cost by doing the following.
- (a) If x and y are the number of units of Food I and Food II respectively, what is the objective function?
 - (b) Give the inequality constraints.
 - (c) Sketch the feasible set.
 - (d) How many units of each type of food the shop must buy to provide the gerbil a healthful diet at minimum cost?
18. A pair of fair dice is tossed. Let X denote the random variable given by the absolute value of the difference of the numbers on the top faces of the dice.
- (a) Give the probability distribution. Write it in a table, show all accompanying calculations, and give exact probabilities.
 - (b) Find the expected value of the random variable.
 - (c) Find the variance and standard deviation of the random variable.