

Math 118 Sample Final Exam

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August 3, 2004

All the usual caveats apply. This sample exam is meant as a study guide only. It indicates what I was thinking as I wrote the test and is meant to provide a very rough guide to the style of the questions and to how they will be distributed across the material covered. If some topic is not mentioned in this sample exam, it may still appear in the “real” Final Exam. It may help to look at Hour Exams 1 and 2 and the quizzes.

You will have two hours. It is very important that you show all work. No work = No marks. There is, of course, also partial credit for partial answers. Not all questions will be worth the same number of points. Your final exam is worth 30% of your final grade.

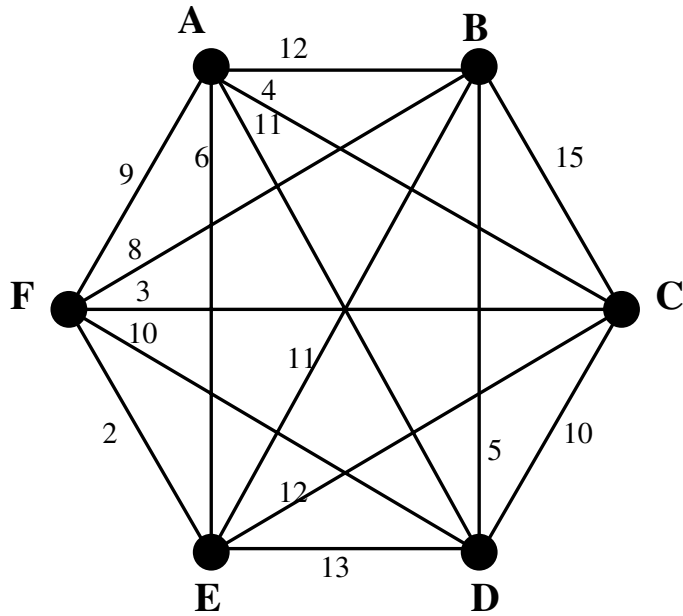
I am currently thinking of having 7 questions on material covered by the first two Hour Exams. There will be 4 or 5 questions on the material covered since then. In addition to these “main” questions, there will be several shorter theory questions, spanning the entire course.

1. The maximum production policy of a soft-drink bottling company is 5000 cartons per day. The company produces at least 600 cartons of regular and 1000 of diet per day. Production costs are \$1.00 per carton of regular and \$1.20 per carton of diet. The daily operating budget is \$5400. How many cartons of each type of drink should be produced if the profit is \$0.10 per regular and \$0.11 per diet? How, if at all, do the maximum profit and optimal bottling policy change if the company has no minimum required production policy?

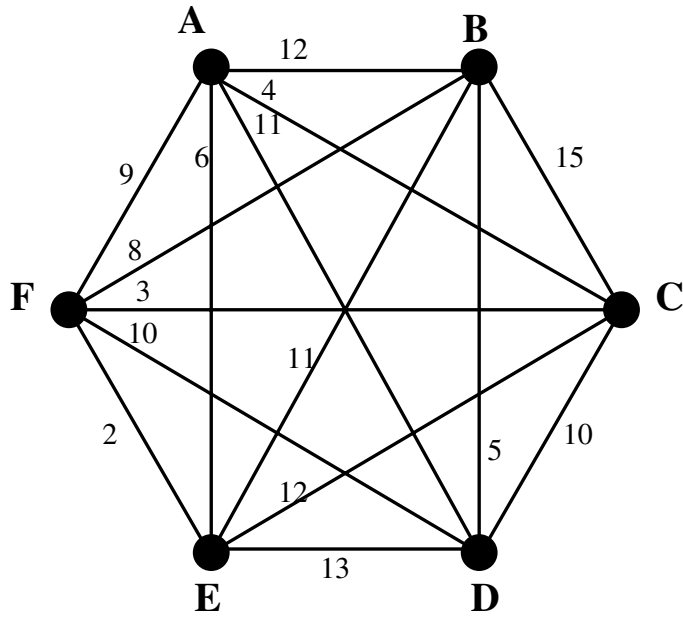
Your answer should include a mixture chart, any relevant inequalities and formulae and a sketch of the feasible region. Also see Hour Exam 1 for a similar question on the same topic.

Questions similar to the next two questions (and Kruskal's algorithm) also appear on Hour Exam 1.

2. Apply the sorted edges algorithm to the following graph. Describe your answer by giving the order in which it passes through vertices in the graph. What is the total weight of your answer? (8 points)



3. Apply the nearest neighbour algorithm to the following graph, starting at vertex *A*. Describe your answer by giving the order in which it passes through vertices in the graph. What is the total weight of your answer? (8 points)



4. Alice plays the following gambling game: one card is drawn from a standard deck of cards with 52 cards. She pays \$2 each time she plays.
- If a red king is drawn, she wins \$10.
If a club is drawn, she wins \$5.
- (a) What is the probability of Alice winning? Of Alice losing?
 - (b) What are Alice's mean winnings/losses for one play?
 - (c) What is the standard deviation of this probability model?

Similar questions can be found on Hour Exam 2.

5. Suppose a simple random sample of 412 students are asked their SAT verbal score. The mean of their scores is found to be 510 and the standard deviation of their scores is 40. Find a 95% confidence interval for the mean SAT verbal score for all students.

You should also look at Questions 1 and 2 on Quiz 5 - many people answered these poorly.

6. The notes C, D, E, F, G, A and B are to be used to form an ordered five-note musical logo.
- (a) What is the probability that the first note in the logo is not repeated?
 - (b) What is the probability that no notes are repeated?
 - (c) What is the probability that only one note is used in the logo?

Similar questions can be found on quiz 2 and Hour Exam 2.

7. The distribution of heights of American women aged 18-24 is approximately normal with mean 65.5 inches and standard deviation 2.5 inches.
- (a) What is the probability that a woman aged between 18 and 24 is shorter than 58 inches?
 - (b) What range of heights includes the 50% of all women closest to the mean height?
 - (c) The tallest 25% of all women are taller than what height?
Suppose that a group of 25 young women is chosen at random and their mean height calculated.
 - (d) What is the probability that their mean height is less than 64.5 inches?
 - (e) What is the probability that their mean height is greater 66 inches?

8. The electricity consumption per capita of 25 countries is listed below.

Country	Description	Amount
1.	Iceland	26143.34 kWh per person
2.	Norway	25362.27 kWh per person
3.	Canada	15661.13 kWh per person
4.	Sweden	15194.71 kWh per person
5.	Finland	14676.00 kWh per person
6.	United Arab Emirates	14125.78 kWh per person
7.	Kuwait	13416.32 kWh per person
8.	Luxembourg	13365.42 kWh per person
9.	United States	12406.03 kWh per person
10.	Qatar	10545.22 kWh per person
11.	Australia	9345.23 kWh per person
12.	Bermuda	9283.21 kWh per person
13.	New Zealand	8827.45 kWh per person
14.	Bahrain	8721.02 kWh per person
15.	Cayman Islands	8470.45 kWh per person
16.	Virgin Islands	7676.83 kWh per person
17.	Belgium	7598.34 kWh per person
18.	Japan	7579.32 kWh per person
19.	Switzerland	7300.53 kWh per person
20.	Slovenia	7144.78 kWh per person
21.	New Caledonia	7115.81 kWh per person
22.	Aruba	6982.94 kWh per person
23.	France	6900.90 kWh per person
24.	Austria	6698.65 kWh per person
25.	Brunei	6484.25 kWh per person

Summarize this information in a frequency table. Use this to draw a histogram.

Also remember that you could be asked to draw a stemplot, boxplot or scatterplot.

9. Suppose that an election is held and that the voters' preference lists are as follows:

Rank	Number of Voters (10)				
	2	2	1	1	1
First	A	B	A	C	D
Second	D	D	B	B	B
Third	C	A	D	D	A
Fourth	B	C	C	A	C

Calculate the winner using

- (a) Plurality voting.
 - (b) The Borda Count.
 - (c) The Hare system.
 - (d) Sequential pairwise voting with the agenda B, D, C, A .
10. Eight mathematics department professors are on a committee that has to meet once a week. Due to their busy schedule they have to meet in the evening. They use approval voting to choose what day of the week they will meet. In the table below, an X indicates an approval vote.

Weekday	Professors							
	1	2	3	4	5	6	7	8
Monday	X		X	X		X	X	X
Tuesday	X	X	X	X	X			
Wednesday	X	X	X			X		
Thursday	X					X		X
Friday	X		X		X		X	
Saturday	X							
Sunday	X						X	

What day will the committee meet on?

- 11. Question 16, p.434 Textbook
- 12. Question 13, p.433 Textbook

There will also be several short theory questions. Most of these will be similar to those found in Skill Check Exercises. I hope to post a list of sample theory questions soon. Also note that the style and content of Chapter 12 means that some questions based on it will be more theory based and will involve less calculations than questions based on, for example, Chapter 4. These questions will require more than a mere numerical answer.

And once more, remember that the final exam will definitely not be the same as this sample exam.