MA 138 A COLLECTION OF REVIEW PROBLEMS

Note: This is NOT a practice exam. It is a collection of problems to help you review some of the material for the exam and to practice some kinds of problems. This collection is not necessarily exhaustive; you should expect some problems on the exam to look different from these problems.

This problem set has more problems from section 8.2 than you should expect on the final exam. Again: this set is *not* representative of the distribution of material on the final exam! In addition to studying the problems on old quizzes, homework assignments, exam review problem sets, and exams, you might want to give the following problems a try.

1. Imagine an experiment in which letter cards that spelled **PROBABILITY** were mixed up in a box.

P	R	O	B	A	B	I	L	I	T	Y

   a. If three letters are selected at random, one at a time, without replacement, what is the probability that the first three letters selected (in order) will spell the word **OIL**?

   b. If five letters are selected at random, one at a time, without replacement, what is the probability that the letters selected (in order) will spell the word **PARTY**?

   c. If four letters are selected at random, one at a time, WITH replacement, what is the probability that none of the letters is a vowel?

2. Imagine you have the following five cards: jack of hearts, jack of diamonds, 10 of spades, 10 of clubs, and 3 of diamonds. Select two at random, replacing each card after you look at it. Find the probabilities of the following events:
   a. Event D: You select two diamonds.

   b. Event E: You select, in order, a 3 and a jack.

   c. Event F: You select, in order, a jack and a 3.

   d. Event G: You do not select a face card.

   e. Find the probabilities of events E and F from above, only this time imagine that you *do not* replace the first card.

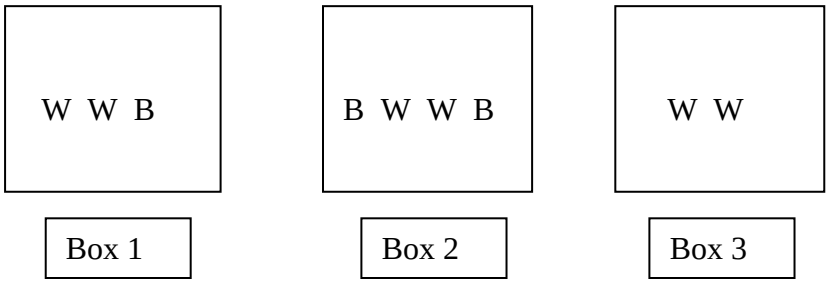
3. Suppose I have four black socks, 8 white socks, and 2 blue socks floating around loose in my drawer. If I draw two socks at random from the drawer, not replacing the first:

   a. What is the probability that I'll draw a pair of black socks?

   b. What is the probability that I'll draw a pair of white socks?

4. A "fair game" is one in which each player has an equal probability of winning. Ian and Margaret are playing a game they call "Odd or Even." To play, they drop three pennies on the floor. If the number of heads showing is odd, then Ian wins. If the number of heads showing is even, then Margaret wins. Is this a fair game? If not, who has the advantage? Explain completely, and show any work you do in determining your answers to these questions.

5. Consider the following boxes. Draw a letter from Box 1 and put it into Box 2, then draw a letter from Box 2 and put it into Box 3. Finally, draw a letter from Box 3.



   a. Construct a tree diagram (showing the probabilities) for this experiment.

   b. What is the probability that the last letter chosen is B?

   c. What is the probability that the last letter chosen is W?

   d. What is the probability that the letters chosen are WBW?

6. Bill, Bob, and Barb went shopping at a craft fair. Bob spent twice as much as Bill, and Barb spent $15 more than Bob. They spent $185 all together. How much did each person spend? Show how to set this problem up with algebra pieces.

7. Solve the following:
   a. $-2x - 6 > 4$
   b. $\frac{1}{3}x + \frac{1}{2} = 3 - \frac{1}{2}x$

8. We have a function $f(x) = 2x^2 - 4$.
   a. Find f(0), f(2), and f(-1).
   b. If the domain is restricted to {0, 1, 2, 3, …}, can this function take on the value 5 with the given domain?
   c. If the domain is restricted to {0, 1, 2, 3, …}, can this function take on the value 46 with the given domain?

9. Pick a number. Subtract three, then double the result. Next add four, then divide by two, and finally add one. What do you get? Does this trick always work? How do you prove it?

10. A cab costs $1.75 plus $0.50 for each 1/10 of a mile. Write a function C so that C(*m*) gives the total fare for *m* miles.

11. You and your best friend are in the same history class, which has 42 students. Your professor opens each class by calling on three students. Each must make some sort of summary of the assigned reading for that day, or they lose lots of points. You and your friend stayed up watching a Leave It to Beaver marathon on Nickelodeon instead of studying last night. What is the probability that you and your friend will be two of the three people called on at the beginning of your next history class?

12. What is the probability of correctly guessing the last four digits of my social security number?

13. How does the previous probability change if I tell you that of the four digits, the first three are even, the fourth is odd, and there are no repeated digits?

14. A jar contains four red marbles, two blue marbles, and three green marbles. You will choose three marbles without replacement.
    a. Find the probability that you select three different colors.
    b. Find the probability that you select two blues and a green (in any order).

15. The phone company did a study of outgoing long-distance phone calls from Earhart Hall. The length of calls was normally distributed. The mean length of such a call was 35 minutes with a standard deviation of 5 minutes. What percent of the calls last more than 40 minutes?

16. A similar study was done for the Windsor Halls. Again, call length was normally distributed. The mean length was 28 minutes with a standard deviation of 9 minutes. Find the *z*-score that corresponds to a phone call of length 35 minutes.

17. Which would you consider more unusual: a 42-minute phone call from Earhart Hall or a 32-minute call from Windsor? Explain.

18. 1400 students took an exam, and the results were normally distributed. The mean score was 75 and the standard deviation was 7 points. How many students scored between 68 and 96?

19. 2500 students took an exam, and the results were normally distributed. The mean score was 81 and the standard deviation was 12 points. What score on the exam would correspond with a *z*-score of 1.75?

20. For the exam above, a student's instructor told her she had a *z*-score of 1.3. The student then tried to calculate her grade, and decided she got a score of 72. Without doing any calculations, decide if you think the student might be correct. Explain what you think and why (without doing calculations!).

21. Replot the data from this stem-and-leaf plot as two box-and-whisker plots. Don't forget to check for outliers. Use these plots to compare the two class's performances. Do the stem-and-leaf plot and the box-and-whisker plot lead to the same conclusion about which class did better? Explain your answer, using information from the box-and-whisker plots.

Mr. Keith's Geometry Grades

First-Hour Class		Last-Hour Class
0	10	000
94443321111	9	1124599
9988777655543	8	135669
5531	7	2333479
	6	0123667
1	5	

22. Consider this statement: "Billy Bob State College tuition increased by 8% in 2002. Due to the current budget problems, tuition will increase by 12% in 2003. So over the last two years, tuition increased 20%." Is this statement true or false? How do you know?

23. Suppose your landlord pays your gas, electric, and water bills. You have to pay your own phone bill. Your landlord says that the price of gas rose 25% last year, and he has records to prove it. Does that justify him raising the rent by 25%? Why or why not? Explain.

24. Pat played in six basketball games, scoring the following numbers of points: 2, 22, 26, 28, 30, 30. Which would be a better indicator of her typical scoring, the mean or median score?

25. The mean exam score for Danny's section of MA 138 was 80. The mean score for Anantha's section was 84. Explain why the overall mean for both sections is not necessarily the mean of 80 and 84.

26. A newspaper editorial says, "Nearly half of our fifth-graders scored below average on a standardized math test. A major remediation effort must begin!" Explain why these test results actually should not be alarming.

27. A class of 23 students had a mean of 78 on a math test. The 10 boys in the class had a mean of 76.2. What was the mean of the girls' test scores?

28. A man bought desserts for 10 people, including himself. Five of the desserts cost \$1 apiece, three cost \$2 apiece, and two cost \$3 apiece. He told his friends, "The desserts cost \$1, \$2, and \$3. So the average cost was $(1 + 2 + 3) \div 3 = \$2$. If each of you gives me \$2, we'll be even."
    a. What was the actual mean price of the desserts?
    b. How much extra money will the man have after charging everyone (including himself) \$2?

29. The ratio of boys to girls in a class is $\frac{4}{5}$. The class has 36 students. How many girls are in the class?

30. A 20-ft-long pipe of uniform width and density is cut into two pieces. One piece is 12 ft long and weights 140 pounds. How much does the other piece weigh?

31. Abby bought a new stereo. The sales tax was 5% and totaled $45.30. What was the price of the stereo (without tax)?

32. John's salary increased by $3,456 this year. His salary was $28,800 before the raise. What percent raise was this? (I.e., $3,456 is what percent of $28,800?)

33. Jane's salary increased from $43,870 to $48,300. How does her raise compare to John's in the previous problem?

34. Find the slope of the line that connects the points (–2, 2) and (4, 6). Write the equation of the line.

35. The line connecting the points (0, 3) and (–3, 1) has the same slope as the line in #29. Are these two lines in fact the same line? How do you know?

36. I bought some potato salad at the Marsh deli. The sticker shows that I bought 2.23 pounds and paid $5.01. What was the price per pound of the salad?

37. Construct a box-and-whisker plot for the following data. Indicate any outliers with asterisks. Identify numbers that you used to construct the plot.

55, 68, 72, 74, 75, 76, 76, 77, 80, 82, 82, 83, 83, 83, 85, 86, 86, 87, 87, 87, 88, 88, 90, 90, 90, 94, 94, 96, 99, 102

38. The following test scores are for two classes that took the same test. The highest possible score on the test was 60. Construct a box-and-whisker plot for the data. Indicate any outliers with asterisks. Which class appears to have performed better on the test? Defend your choice.

Class 1 (32 scores): 19, 24, 27, 34, 35, 35, 38, 39, 40, 40, 41, 41, 42, 43, 44, 44, 45, 47, 48, 49, 50, 50, 51, 51, 53, 53, 56, 56, 56, 57, 57, 59.

Class 2 (23 scores): 22, 28, 31, 32, 33, 34, 34, 35, 36, 37, 39, 40, 40, 41, 43, 44, 45, 45, 50, 50, 50, 51, 56.

39. The following list gives the mass, in kilograms, of each child in Ms. Rathert's class. Construct a box-and-whisker plot for the data. Indicate any outliers with asterisks. Identify numbers that you used to construct the plot.
31, 39, 39, 39, 40, 40, 41, 42, 42, 42, 42, 43, 43, 44, 45, 46, 47, 48, 49, 49, 49, 60

You might also want to give the following problems from the textbook a look. Answers are in the back of the book.
p 118: 6, 7, 8, 9, 10, 11
p 422: 1, 4, 6 (do the problems by hand), 9, 16, 17, 19
p 503: 7 (you do *not* need to compute standard deviation to answer this question), 8, 9, 10, 11, 12, 13, 14
p 546: 1, 2, 3, 5, 6, 7, 9, 13, 15