

MGF 1106 Final Exam Review / (sections -----)

Time of Common Final Exam: _____

Place of Common Final Exam (Sections ----- only): -----

Those students with a final exam conflict (with another higher-numbered course) please contact your instructor. Make sure to get early to the final exam. No final exam make ups will be given.

Please bring a photo ID to the final exam!

Calculators: *Calculators (no cell phones) may be used on the final exam, but they CANNOT be shared.*

Content: The Final Exam consists of 55 multiple-choice questions.

Here is a chapter-by-chapter breakdown of the content of those 55 questions and also some suggested review problems. You should be familiar with the terms listed under vocabulary.

Chapter 2: We will select 8 questions similar to the ones below.

Concepts: empty set, universal set, subset, intersection, union, complement, Venn diagram

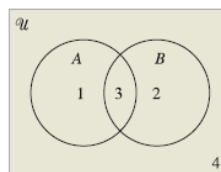
1. Write the set $\{x \mid x \text{ is a counting number less than } 8\}$ using the listing (roster) method. **2.1, #27**
2. How many subsets does the set $A = \{a, b, c, d\}$ have? **2.1, #57**

Let $U = \{a, b, c, d, e, f\}$, $A = \{a, c, e\}$, $B = \{b, d, e, f\}$, and $C = \{a, b, d, f\}$. Find each specified set

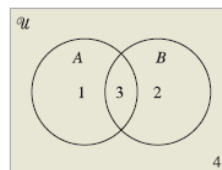
3. **a.** $(A \cap B) \cup C'$ **b.** $C \cup (A \cap B)'$ **2.2, #19**
4. Let $U = \{1, 2, 3, 4, 5\}$, $A = \{2, 3, 4\}$, and $B = \{1, 4, 5\}$. **2.2, #28**
 Find: **a.** $A - B$ **b.** $B - A$

Draw a Venn diagram and shade the region in the figure representing each specified set.

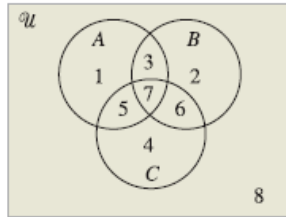
5. $(A \cup B) - (A \cap B)$ **2.3, #5**



6. $A' \cap B'$ **2.3, #7**



7. Use the numbered regions of the diagram to identify the set. $C \cap (A \cup B)$ 2.3, #10



8. Draw a Venn diagram that satisfies the equation $A \cap B = B$ 2.3, #29

9. Given $A \cap B = \{a, b\}$, $A \cap B' = \{c, e\}$, $A' \cap B = \{g, h\}$, and $(A \cup B)' = \{d, f\}$, use a Venn diagram to find the following: 2.3, #37

- a. $A, B,$ and U b. $A \cup B$ c. $(A \cap B)'$

10. Suppose that $n(A) = 15$, $n(A \cap B) = 5$, and $n(A \cup B) = 30$. Find $n(B)$. 2.4, #3

11. Use the table to find the number of people in the following sets: 2.4, #10

Department*	(A)	(C)	(O)	(SK)	(SS)	(U)
Purchasing (P)	1	14	7	0	0	0
Quality control (Q)	11	7	6	21	53	11
Sales (S)	8	8	40	0	0	0
Manufacturing (M)	5	7	0	9	23	37
Janitorial (J)	3	0	0	6	8	11

*(A) administrative, (C) clerical, (O) other, (SK) skilled, (SS) semiskilled, (U) unskilled.

- a. $A \cap S$ b. $S \cup P$
 c. $M \cap A' \cap SK'$ d. $S \cap A' \cap C'$

12. In a survey conducted in a certain U.S. city, the data in the following table were collected: 2.4, #14

Income	White (W)	Black (B)	Other (O)
Over \$10,000 (H)	50	15	10
\$7000–\$10,000 (M)	40	25	15
Under \$7000 (L)	30	35	20

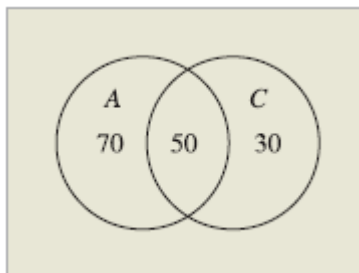
Find the number of people in the following sets:

- a. M b. M' c. $(O \cup B) \cap W'$ d. $L \cup O'$ e. $H \cap B'$

13. The number of students taking algebra (A) or chemistry (C) is shown in the diagram below. Find the following:

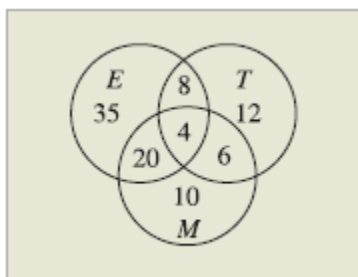
2.4, #21

- a. $n(A)$
- b. $n(C)$
- c. $n(A \cap C)$



14. On checking with 100 investors to see who owned electric company stock (E), transportation stock (T), or municipal bonds (M), the numbers shown in the diagram below were found.

2.4, #25



- a. How many investors owned electric company or transportation stock, but not both?
- b. How many owned electric company or transportation stock, but not municipal bonds?
- c. How many had one or two of these types of investments, but not all three?
- d. How many had at least two of these types of investments?
- e. How many had none of these types of investments?

Chapter 3: We will select 9 questions similar to the ones below.

Concepts: negation, conjunction, disjunction, conditional, contrapositive, inverse, converse, biconditional, De Morgan's laws, truth table, equivalent statements, symbolic logic, premise/conclusion, valid/invalid argument.

15. Let p be "Ricky loves Lucy" and q be "Lucy loves Ricky." Give a verbal translation of the statement $\sim p \wedge \sim q$.

3.1, #24

16. Give the negation of the statement: Some basketball players are not 6 ft. tall.

3.1, #37

17. Give the negation of the statement: Either he is bald or he has a 10-in. forehead.

3.1, #39

18. Let g be "He is a gentleman" and let s be "He is a scholar." Write this statement in symbolic form: He is a gentleman and a scholar.

3.2, #9

19. Consider the statements p and q . 3.2, #11
- p : It is raining.
- q : I will go to the beach.
- Write the statements in parts (a) and (b) in symbolic form.
- a.** It is raining but I will go to the beach.
- b.** It is raining or I will go to the beach.
- c.** Assume that p is true and q is false. Find the truth values of the statements given in parts **a.** and **b.**
20. Consider the following statements: 3.2, #23
- g : I go to college.
- j : I join the army.
- Suppose that g is false and j is true. Write a statement in symbolic form, and find its truth value of the statement: I go to college or I do not join the army.
21. Construct a truth table for the statement: $\sim (p \vee \sim q)$ 3.2, #31
22. Use a truth table to show that the two given statements are equivalent.
- $\sim (p \vee q)$ and $\sim p \wedge \sim q$ 3.2, #45
23. Construct a truth table for $(p \rightarrow q) \leftrightarrow (p \vee r)$. Note the importance of the parentheses to indicate the order in which items are grouped. 3.3, #15
24. Construct a truth table for $p \rightarrow (q \wedge r)$. 3.3, #17
25. Let p be “I will buy it” and let q be “It is a poodle.” Translate: If it is a poodle, then I will not buy it, into symbolic form. 3.3, #25
26. Which of the following statements is logically equivalent to “If Mary is in Tampa, then she is in Florida?” 3.3, #55
- a.** Mary is in Florida, or she is in Tampa.
- b.** If Mary is not in Tampa, then she is not in Florida.
- c.** If Mary is in Florida, then she is in Tampa.
- d.** If Mary is not in Florida, then she is not in Tampa.
27. Let h be “honk” and u be “you love Ultimate.” Write: “A necessary condition for loving Ultimate is to honk”, in symbolic form. 3.4, #19

28. Use an Euler diagrams to determine the validity of the argument 3.5, #7

All professors are wise.

Ms. Brown is a professor.

\therefore Ms. Brown is wise.

29. Use an Euler diagrams to determine the validity of the argument 3.5, #15

No mathematics teacher is wealthy.

No panthers teach mathematics.

\therefore No panthers are wealthy

30. Symbolize the argument using the suggested abbreviations and determine the validity of the given argument. 3.6, #6

If prices go up (u), management will scream (s).

If management screams, then supervisors will get tough (t).

Hence, if prices go up, supervisors will get tough.

Given the two premises below, what conclusion will make the argument valid? 3.6, #41

31. If I drive to work, then I will not be late.

If I am not late, then I do not lose any pay.

- a. If I am not late, then I drive to work.
- b. If I do not lose any pay, then I drive to work.
- c. If I drive to work, then I do not lose any pay.
- d. If I do not drive to work, then I lose some pay.

Chapter 8: We will select 11 questions similar to the ones below.

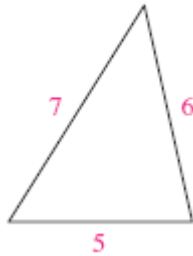
Concepts: quadrilateral (trapezoid, rectangle, square), triangle (obtuse, acute, right, isosceles, equilateral, scalene, similar), right angle, Pythagorean theorem, circle, sphere, radius, diameter, circumference, perimeter, area, surface area, volume.

32. Name the quadrilateral 8.2, #13



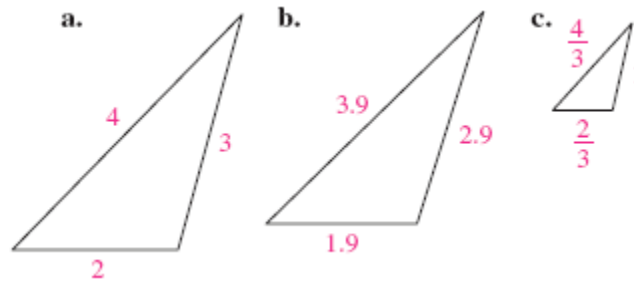
33. Classify the triangle as scalene, isosceles, or equilateral and as acute, right, or obtuse.

8.2, #19



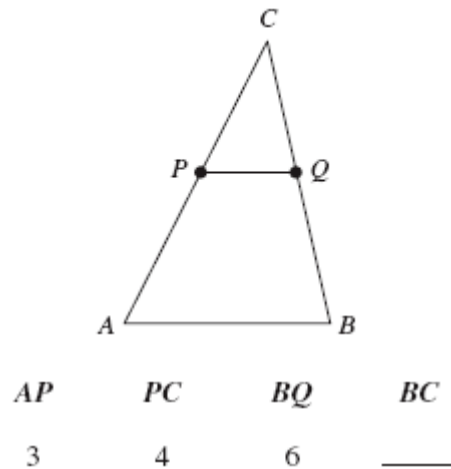
34. Which (if any) of the following triangles are similar?

8.2, #25



35. In this figure \overline{PQ} is parallel to AB . Certain lengths are given. Find the missing length indicated by a blank.

8.2, #29



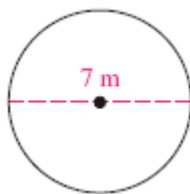
36. A telephone pole casts a shadow 30 ft long at the same time that a 5-ft fence post casts a shadow 8 ft. long. How tall is the telephone pole?

8.2, #37

37. The playing surface of a football field is 120 yd long. A player jogging around the perimeter of the surface covers 346 yd. How wide is the playing surface?

8.3, #14

38. Find the circumference of



8.3, #17

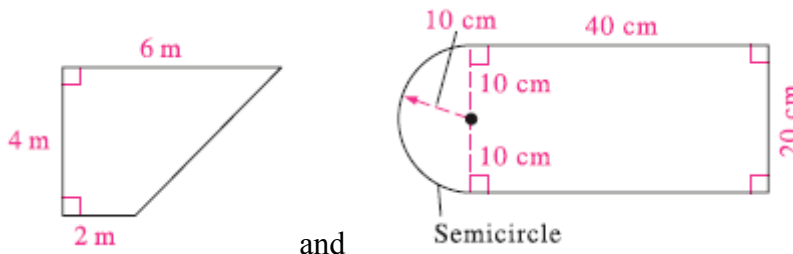
First give the answer in terms of π ; then calculate the approximate answer using $\pi = 3.14$.

39. The circumference of a circle is 15π cm. Find the diameter and the radius of this circle.

8.3, #31

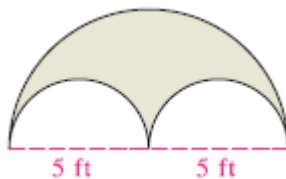
40. Find the area of each region.

8.4, #4, #9



41. Find the shaded area

8.4, #15



42. A rectangle has a diagonal 17 ft long and a length of 15 ft. How wide is it?

8.4, #17

43. Find the height of a triangle of area 70 in.^2 if its base is 20 in. long.

8.4, #32

44. State what happens to the area of a rectangle if both its dimensions are

8.4, #39

a. doubled.

b. tripled

c. multiplied by a constant k .

45. a. If the edges of a cube are doubled in length, what happens to the volume? 8.5, #9

b. What if the lengths are tripled?

46. For a rectangular solid that is 20 in. long, 10 in. wide, and 8 in. high, find

8.5, #11

a. the volume V

b. The total surface area S .

47. Find the volume of a sphere of radius 6 in.

8.5, #25

48. A basket ball with a 30-in. circumference is tightly packed into a cubical box for shipment. **8.5, #36**

- a. What is the volume of the ball?
- b. What is the smallest possible volume for the box?
- c. What percent of the space in the box is occupied by the basketball?

Chapter 10: We will select 5 questions similar to the ones below.

Concepts: sequential counting principle, permutation, combination, with/without replacement, order.

49. In Connecticut, auto license plates carry 3 digits followed by 3 letters. **10.1, #16**

- a. How many arrangements are possible for the 3 letters?
- b. How many arrangements are possible for the 3 numbers?
- c. How many different license plates can be made using 3 numbers followed by 3 letters?

50. Social Security numbers consist of nine digits. **10.1, #19**

- a. If the first digit cannot be 0, how many Social Security numbers are possible?
- b. How many Social Security numbers are possible if there are *no* restrictions?

51. Compute $\frac{P(6,3)}{4!}$ **10.2, #16**

52. Six coins are tossed, in how many ways can you have at least one tail? **10.2, #36**

53. How many of the first 100 natural numbers are multiples of 2 or multiples of 5? **10.2, #39**

54. How many license plates using six digits can the state of Vermont issue if repetition of digits is **10.2, #41**

- a. permitted?
- b. *not* permitted?
- c. In the 1990 census the population of Vermont was about 600,000. Why do you think Vermont allows repetition of digits in its license plates? (It now uses three letters and three numerals.)

55. If 20 people all shake hands with each other, how many handshakes are there? **10.3, #20**

56. How many different 5-card poker hands are possible using a deck of 52 cards? **10.3, #25**

57. There are 4 vacancies on the scholarship committee at a certain university. In order to balance the men and women on the committee, 1 woman and 3 men are to be appointed. In how many ways can this be done if the following are available to serve? **10.4, #11**

- a. 7 men and 8 women
- b. 5 men and 2 women

Chapter 11: We will select 10 questions similar to the ones below.

Concepts: sample space, experiment, event, outcome, probability, odds, independent events, conditional probability

58. A single ball is taken at random from an urn containing 10 balls numbered 1 through 10. What is the probability of obtaining a ball that is either less than 5 or odd? **11.1, #10**

59. In a survey conducted on a Friday at Quick Shop Supermarket, it was found that 650 of 850 people who entered the supermarket bought at least 1 item. Find the probability that a person entering the supermarket on a Friday will purchase **11.1, #45**

- a. at least 1 item
- b. no item.

60. Use the following survey table which gives the numbers of males and females falling into various salary classifications. On the basis of the information in the table, find the probability that a person selected at random from those surveyed is a female with **11.1, #49**

- a. an average income.
- b. a high income.

<i>Salary</i>	<i>Sex</i>		<i>Totals</i>
	<i>M</i>	<i>F</i>	
Low	40	200	240
Average	300	160	460
High	500	300	800
Totals	840	660	1500

61. A committee of 2 is chosen at random from a population of 5 men and 6 women. What is the probability that the committee will consist of 1 man and 1 woman? **11.2, #10**

62. Assume that 2 cards are drawn in succession and without replacement from an ordinary deck of 52 cards. Find the probability that 2 kings are drawn **11.2, #11**

63. An urn contains 5 white balls and 3 black balls. Two balls are drawn at random from this urn. Find the probability that **11.2, #22**

- a. both balls are white.
- b. both balls are black.

c. one ball is white and the other is black.

64. Two dice are rolled. Find the probability that the sum of the two faces that turn up is between 0 and 13. **11.3, #3**

65. A single card is drawn from a deck of 52 cards. Find the probability the card chosen is the king of hearts or a picture card (jack, queen, or king). **11.3, #13**

66. The personnel director of Gadget Manufacturing Company has compiled the following table, which shows the percent of men and women employees who were absent the indicated number of days. Suppose there are as many women as men employees. **11.4, #9**

<i>Absences (Days)</i>	<i>Sex</i>	
	<i>Men</i>	<i>Women</i>
0	20%	20%
1 - 5	40%	20%
6 - 10	40%	20%
11 or more	0%	40%
Total	100%	100%

a. Find the probability that an employee missed 6-10 days, given that the employee is a woman.

b. Find the probability that an employee is a woman, given that the employee missed 6-10 days.

67. A recent survey of 400 instructors at a major university revealed the data shown in the following table. Based on the data, what are the probabilities of the following? **11.4, #19**

a. An instructor received a good evaluation, given that the instructor was tenured.

b. An instructor received a good evaluation.

<i>Status</i>	<i>Good</i>	<i>Poor</i>
	<i>Evaluations</i>	<i>Evaluations</i>
Tenured	72	168
Nontenured	84	76

68. A computer repair shop has estimated the probability that a computer sent to the shop has a bad modem is $\frac{1}{4}$, the probability that the computer has a bad CPU is $\frac{1}{8}$, and the probability that it has a bad drive is $\frac{1}{3}$. If we assume that modems, CPU's, and drives are independent, find the probability that

11.5, #3

- a. a modem, a CPU, and a drive in a computer sent to the shop are bad.
- b. only a modem and a CPU in a computer sent to the shop are bad.
- c. none of the three parts(modem, CPU, or drive) is bad.

69. A company has estimated that the probabilities of success for three products introduced in the market are $\frac{1}{4}$, $\frac{2}{3}$, and $\frac{1}{2}$, respectively. Assuming independence, find the probability that

11.5, #31

- a. the three products are successful.
- b. none of the products is successful.

70. Find the odds in favor of obtaining a vowel when 1 letter is chosen at random from among the 26 letters of the English alphabet.

11.6, #7

71. If the correct odds in favor of Johnny's winning a race are 3 to 2, what is the probability that Johnny wins?

11.6, #15

Chapter 12: We will select 12 questions similar to the ones below.

Concepts: sample, frequency distribution (frequency, relative frequency), measures of central tendency (mean, median, mode), measures of dispersion (range, standard deviation), normal distribution, circle graph, regression line, prediction, correlation

72. A student has a mean score of 88 on five tests taken. What score must she obtain on her next test to have a mean (average) score of 80 on all six tests?

12.2, #14

73. The table below shows the distribution of families by income in a particular urban area.

12.2, #15

<i>Annual Income (\$)</i>	<i>Portion of Families</i>
0-9999	0.02
10,000-14,999	0.09
15,000-19,999	0.25
20,000-24,999	0.30
25,000-34,999	0.11
35,000-49,999	0.10
50,000-79,999	0.07
80,000-119,999	0.05
120,000+	0.01

- a. What proportion of the families has incomes of at least \$25,000?
- b. What is the median income range?
- c. Find the mean of the lower limits for the annual incomes.
- d. Find the amount below which 36% of the families have lower incomes.

74. In a mathematics test given to 50 students, 25 earned scores of 90. Most of the other students scored 80, and the remaining students scored 30. Which of the following statements is true about the distribution of scores?

12.2, #17

- a. The mode is the same as the mean.
- b. The median is greater than the mean.
- c. The mode is greater than the mean.
- d. The mean is greater than the median.

75. Out of 10 possible points, a class of 20 students made the following test scores:

0, 0, 1, 2, 4, 4, 5, 6, 6, 6, 7, 8, 8, 8, 8, 9, 9, 9, 10, 10

12.3, #11

- a. What is the mode?
- b. What is the median?
- c. What is the mean?
- d. Calculate the standard deviation to the nearest hundredth.
- e. What percent of the scores lie within 1 standard deviation from the mean?
- f. What percent of the scores lie within 2 standard deviations from the mean?

76. The daily numbers of pounds of garbage for 6 different households were

12.3, #15

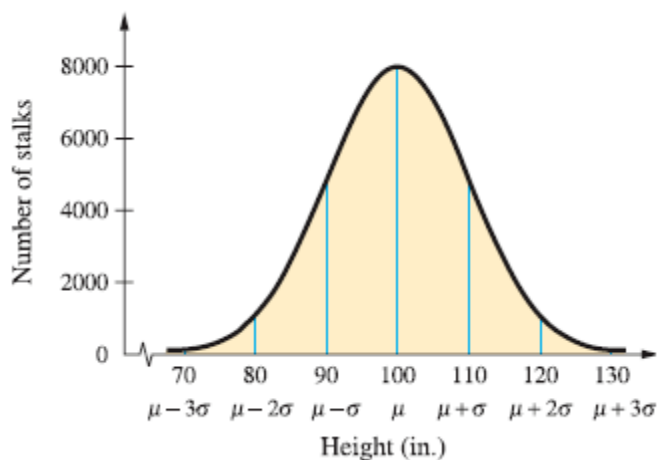
6, 2, 17, 3, 5, 9

Find the range, mean, and standard deviation of the weights.

77. Suppose the standard deviation of a set of numbers is 0. What does this tell you about the numbers? Explain. 12.3, #27

78. Two classes, each with 100 students, took an examination with a maximum possible score of 100. In the first class, the mean score was 75 and the standard deviation was 5. In the second class the mean score was 70 and the standard deviation was 15. Which of the two classes do you think had more scores of 90 or better? Why? 12.3, #30

79. Farmer Brown has planted a field of experimental corn. By judicious sampling, it is estimated that there are about 20,000 plants and that a graph of their heights looks like that shown in the next figure. 12.4, #1



- a. What is the mean height of farmer Brown's corn?
- b. What is the standard deviation from the mean?
- c. What percent of the cornstalks is between 90 and 110 in. tall?
- d. About how many stalks are between 80 and 90 in. tall?

80. Part of a test given to young children consists of putting together a simple jigsaw puzzle. Suppose that such a puzzle is given to 1000 children, each child is timed, and a graph of the times is made. Suppose the graph is a normal curve with a mean time of 120 sec and a standard deviation of 15 sec. 12.4, #3

- a. About how many of the children finished the puzzle in less than 90 sec?
- b. How many took more than 150 sec?
- c. If you rated as "average" all the children within 1 standard deviation from the mean, how many children would fall into this classification?

81. For a certain standardized placement test, it was found that the scores are normally distributed with a mean of 200 and a standard deviation of 30. Suppose this test is given to 1000 students. **12.4, #4**

a. How many are expected to make scores between 170 and 230?

b. How many are expected to score above 260?

c. What is the expected range of all the scores?

82. Assume a normally distributed set of test scores with a mean of $\mu = 100$ and a standard deviation of 15. Find the probability that a person selected at random will have a score between **12.4, #29**

a. 100 and 110.

b. 100 and 130.

83. Assume a normally distributed set of test scores with a mean of $\mu = 100$ and a standard deviation of 15. Find the probability that a person selected at random will have a score **12.4, #31**

a. between 55 and 145.

b. less than 60.

84. Assume a normally distributed set of test scores with a mean of $\mu = 100$ and a standard deviation of 15. Find the probability that a person selected at random will have a score between 110 and 130. (*Hint:* In problem 82 you found the probability that the score will be between 100 and 110 and the probability that the score will be between 100 and 130. You should be able to see how to combine these two results to get the desired probability.)

12.4, #33

85. In Florida, the daily water usage per person is normally distributed with a mean of 110 gal and standard deviation of 10 gal. Between which intervals will 95% and 99% of the daily water usage lie? **12.4, #44**

86. A company specializing in leisure products surveyed 500 people and found their favorite activities were as follows: **12.5, #39**

75 read.

60 had family fun.

250 watched TV.

65 had other activities.

50 watched movies.

Make a circle graph for this data.

87. The U.S. Department of Labor updated its theoretical budget for a retired couple. The high budget for such a couple is apportioned approximately as follows: **12.5, #41**

Food	22%
Housing	35%
Transportation	11%
Clothing	6%
Personal care	3%
Medical care	6%
Other family costs	7%
Miscellaneous	7%
Income taxes	3%

Make a circle graph to show this budget.

88. A recent study indicates that 9 out of 50 males and 19 out of 50 females squeeze their toothpaste tubes from the bottom. In a group of 200 males and 200 females, how many males and how many females would you expect to be squeezing their toothpaste tubes from the bottom? **12.6, #24**

89. The table below shows the marriage rate y for 1000 Americans from 1980 to 2000.

x	1980	1985	1990	1995	2000
y	10.5	10	9.5	9	8.5

Source: U.S. National Center for Health Statistics.

a. Make a graph for the data. **12.6, #28**

b. Predict the marriage rate for the year 2005.

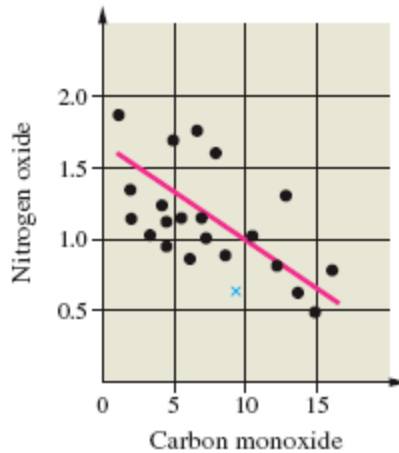
c. If you select a representative sample of 5000 Americans in the year 2005, how many would you expect to marry? (*Hint*: Follow the pattern!)

90. A linear regression line $y = 10 + 0.9x$ is computed to predict the final exam score y on the basis of the first score x on the first test. Suppose Maria scores a 90 on the first test.

What would be the predicted value of her score on the final exam? **12.7, #15**

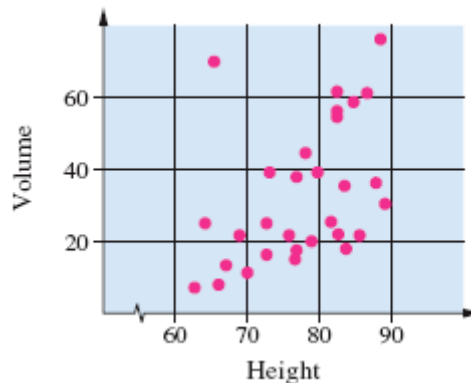
- a. 81 b. 89 c. 91 d. Cannot be determined

91. The scattergram shows the amount of carbon monoxide and nitrogen oxide emitted in the exhaust of cars per mile driven. 12.7, #17



On the basis of the scattergram, the least-squares line would predict that a car emitting 10 g of carbon monoxide per mile driven would emit how many grams of nitrogen oxide per mile driven?

- a. 1.1
 - b. 2.2
 - c. 10
 - d. 1.4
92. 12.7, #18



The scattergram indicates

- a. a positive association between height and volume.
- b. a negative association between height and volume.
- c. neither (a) or (b)
- d. no association between height and volume.

In addition to doing the problems above, *make sure you understand all the answers to the problems posed on the exams and other graded work you did during the semester.*

Comments on taking a multiple-choice test:

- (1) You will be gridding your answers on a scantron sheet using a #2 pencil. The exams will be machine-graded, so it is important that you clearly mark your intended answer. If you decide to change your answer on a problem, erase the previous answer thoroughly. Also, make sure you have only shaded in one oval for each problem.
- (2) You will have two hours to take the exam. This should be plenty of time, but you might want to skip problems that you don't immediately understand and come back to them later. However, if you skip problems like this, be sure to mark the oval corresponding to the appropriate problem.
- (3) There will be no penalty for guessing, so don't leave any answers blank. If you need to guess at an answer, first try to eliminate one or two of the four options.
- (4) Double check everything. Often the answer that corresponds to making a simple mistake will be one of the options given, and there will of course be **no partial credit**.
- (5) Look at each of the options given. Sometimes the answer may become apparent to you after you see the choices available.