

## Math 110 Review for Exam 3 Spring 2002

1. A family has 3 children, find the probability that the family has three daughters, given that the family has at least two daughters.
2. If  $p(E) = \frac{5}{9}$ ,  $p(F) = \frac{3}{9}$  and  $p(E \cup F) = \frac{8}{9}$ , find  $p(E|F)$ .
3. A personal computer manufacturer buys 45% of his chips from Japan and the rest from America. 0.8% of the Japanese chips are defective, and 0.6% of the American chips are defective. Use a tree diagram to find the following probabilities: (a) A chip is defective, given that it is made in Japan. (b) A chip is defective and it is made in Japan. (c) A chip is defective.
4. A couple has two children. (a) What is the probability that both children are girls, given that one of the children is a girl? (b) What is the probability that both children are girls, given that the oldest child is a girl.

5. In order to determine the effect their salespersons have on purchases, a department store polled 700 shoppers regarding whether or not they made a purchase and whether or not they were pleased with the service.

Poll Results

	Happy with the Service	Not Happy with the Service	Total
Made Purchase	151	133	284
No Purchase	201	215	416
Total	352	348	700

The results can be found in the table on the right. Find the probabilities of the following events: (a) A shopper made a purchase. (b) A shopper was happy with the service. (c) A shopper was happy with the service and made a purchase. (d) A shopper made a purchase given that he or she was happy with the service. (e) A shopper made a purchase given that he or she was not happy with the service.

6. The speed, in miles per hour, of forty randomly monitored cars on I-65 near Evergreen, Alabama, were recorded as follows:

69 71 79 61 76 78 76 67 84 63 72 77 69 73 77 63 71 61 65 73  
64 78 80 76 62 70 72 62 74 68 57 69 76 79 67 68 60 51 71 81

- (a) Organize the data by creating a frequency distribution. (Group the data into six intervals.)
  - (b) Construct a histogram to represent the data.
  - (c) What percentage of cars was going 75 miles per hour and faster.
7. (a) Explain the difference between relative frequency and relative frequency density. (b) When is relative frequency density used as the vertical scale in constructing a histogram? Why?
  8. Consider the following set of quiz scores from a Math 110 class.

10 6 8 5 4 7 8 8 10 9 7 5 10 8 7 7 7 8 5 8 4 8 8 10 6 8 9 8 10 8

- (a) Find the mean.
  - (b) Find the median.
  - (a) Find the mode.
9. Consider the quiz scores from problem 8. (a) Find the variance and the standard deviation. (b) What percentage of data lies within one standard deviation?
  10. The amount of time between taking a decongestant and getting relief is normally distributed with a mean of 29 minutes and a standard deviation of 5 minutes. Find the probability that the time between taking the medication and getting relief is between 25 and 35 minutes.
  11. The shrinkage in length of a certain brand of blue jeans is normally distributed with a mean of 1.45 inches and a standard deviation of 0.35 inches. What percentage of this brand of jeans will shrink between 1 and 2 inches?
  12. The average lifetime for a car battery of a certain brand is 170 weeks, with a standard deviation of 10 weeks. If the company guarantees the battery for 3 years, what percentage of the batteries sold would be expected to be returned before the end of the warranty period?
  13. Scholastic Aptitude Tests are scaled so that the mean score is 500 and the standard deviation is 100. What score does a student need to be in the top 20%?

14. A random sample of 100 students was taken from the entering freshmen class at a large university, and their Scholastic Aptitude Test scores in Mathematics were recorded in the table on the right

SAT test Scores (Mathematics) of 100 Entering Freshmen.

Test Scores	Frequency	Relative Frequency	Relative Frequency Density
$299.5 \leq x < 449.5$	8		
$449.5 \leq x < 499.5$	10		
$499.5 \leq x < 549.5$	21		
$549.5 \leq x < 599.5$	20		
$599.5 \leq x < 649.5$	19		
$649.5 \leq x < 699.5$	11		
$699.5 \leq x < 799.5$	11		

(a) Find the relative frequency and the relative frequency density and fill in the table. (b) Construct a histogram to represent the data and explain why relative frequency density should be used as the vertical scale in constructing the histogram.

15. The average rainfall in Hillsboro in September is 4.64 inches with a standard deviation of 0.80 inches. Find the probability that next September's rainfall will be below 4 inches.

16. The grades in a large American History class fall reasonably close to a normal distribution with a mean of 66 and a standard deviation of 17. The professor "curves" the grades. If the top 12% receive A's, what score is needed to obtain an A?

17. Previous quizzes.

**Additional Problems:**

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| <b>Section 3.6,</b> | <b>Problems 3 – 6, 7, 13, 21, 22, 33 – 36</b> |
| <b>Section 4.1,</b> | <b>Problems 5, 9, 13</b>                      |
| <b>Section 4.2,</b> | <b>Problems 11, 13</b>                        |
| <b>Section 4.3,</b> | <b>Problems 11, 13, 14</b>                    |
| <b>Section 4.4,</b> | <b>Problems 13, 15, 17, 19, 20</b>            |