

Finite Math, MATH 1100

Exercises review 3 (for the final exam)

1. The owner of an ice cream shop tested new flavors on 100 people and obtained the following results:

- 60 liked caramel apple;
- 41 did not like hazelnut;
- 9 did not like either.

How many people liked both?

2. After a genetic experiment on 50 pea plants, the number of plants having certain characteristics were tallied, with the following results:

- 22 were tall;
- 25 had green peas;
- 39 had smooth peas;
- 9 were tall and had green peas;
- 20 had green peas and smooth peas;
- 6 had all three characteristics;
- 4 had none of the characteristics.

Find the number of plants that were tall and had smooth peas but not green.

3. You are given the following data regarding the probabilities of two events E and F :

$$P(E') = 0.4, \quad P(E \cup F) = 0.8, \quad P(F) = 0.3.$$

- (a) Compute $P(E'|F')$ and $P(E' \cup F')$.
- (b) Are E and F independent? Are they mutually exclusive?

4. A survey of 100 students at Fordham results in the following data:

- 25 are majoring in Math;
- 40 are majoring in Finance;
- 40 are neither Math nor Finance majors.

Find the probability that :

- (a) a student is a double major in Math and Finance.
- (b) a student is a Math major, given that he/she is a Finance major.

5. According to a recent report, 68.3% of men and 64.1% of women in the US are overweight. Given that 49.3% of Americans are men and 50.7% are women, find the probability that a randomly selected American fits the following description.
 - (a) An overweight man.
 - (b) Overweight.
 - (c) Are the events “male” and “overweight” independent?
6. A test has a probability 0.95 of giving a positive result to a person who suffers from a certain disease, and a probability 0.10 of giving a false positive when applied to a non-sufferer. It is estimated that 0.5% of the population are sufferers.
 Suppose the test is administered to a person. Find the following probabilities:
 - (a) the test result will be positive;
 - (b) the person is a sufferer, given a positive result;
 - (c) the person is a non-sufferer, given a negative result.
7. There are two boxes, A and B. Box A contains 4 blue balls and 6 red balls, while box B contains 7 blue balls and 3 red balls. We choose a box randomly and draw a ball out of it. The probability of choosing box A is $1/3$. Suppose a blue ball is drawn. Find the probability that it came from box A.
8. How many different 4-letter radio station call letters can be made if:
 - (a) the first letter must be K or W and no letter may be repeated?
 - (b) repetition is allowed, but the first letter is K or W?
 - (c) the first letter is K or W, there are no repeats, and the last letter is R?
9. A company has 10 employees: 6 with a college degree and 4 without.
 - (a) How many groups of 3 employees can be formed?
 - (b) How many groups of 4 employees consist of 2 with a college degree and 2 without?
 - (c) How many groups of 5 employees consists of at most 3 with a college degree?
10. Suppose a box contains 4 blue marbles, 3 yellow marbles and 6 green marbles. You randomly sample without replacement 5 marbles. Find the probability that you draw at most 1 yellow marble.
11. Suppose a tennis player wins a game with probability 0.35. Assume independence between games. Find the probability that the player wins exactly 3 out of 10 games.
12. Consider the following card game. You draw 3 cards from a standard deck of cards without replacement. You win \$10 if you draw 3 spades, \$5 if you draw 3 red cards (hearts or diamonds), and nothing otherwise. Let X denote the total winning of the game. Find the distribution and the expected value of X .
13. Find the mean and the median of the following data set:

22, 34, 45, 66, 72, 81, 90.
14. SAT scores (out of 2,400) are normally distributed with $\mu = 1,500$ and $\sigma = 300$.

- (a) Find the probability that a SAT taker scores more than 2,000.
 - (b) Suppose 10 SAT takers are randomly chosen. Find the probability that 3 of them scored more than 2,000.
15. The final grades (out of 100) of a class are normally distributed with mean 80 and standard deviation 10.
- (a) Find the percentage of students whose scores were 60 or lower.
 - (b) The professor divides the class into three ranges: A, B and C ranges (no D or F), so that the top 30% of the class is in the A range, the middle 40% is in the B range and lower 30% is in the C range. Find the cutoff grades for each range.
16. Find the future value of \$15,000 compounded monthly for 10 years with an interest rate of 6%. Find the interest earned.
17. Find the present value of \$7,500 with an interest rate of 5.5% compounded quarterly for 9 years.
18. James puts \$100 at the end of each month in a savings account that pays 2.25% interest compounded monthly. How much is in the account after 2 years? How much interest did he earn?
19. David buys a car costing \$14,000. He agrees to make payments at the end of each quarter for 4 years. He pays 7% interest, compounded quarterly. Find the amount of each payment and the total amount of interest David will pay.
20. A student borrows \$55,000 at 4.7% compounded monthly. The standard plan repays the loan in 10 years with equal monthly payments. Find the monthly payments and the total interest paid.
21. A couple has a \$150,000, 30-year mortgage at 6.1% compounded monthly.
- (a) Find the monthly payment.
 - (b) Find the unpaid balance after 10 years.
22. A couple wishes to have \$40,000 in 6 years for the down payment on a house. At what rate of interest compounded continuously must \$25,000 be invested now to accomplish this goal?
23. A company decides to establish a sinking fund to replace a piece of equipment in 6 years at an estimated cost of \$50,000. To accomplish this, they decide to make fixed monthly payments into an account that pays 6.12% compounded monthly. How much should each payment be?
24. How long will it take to double an investment P at 6.2% interest rate continuously compounded?
25. Find the amount of money that has to be deposited today into an account at 8% compounded quarterly if quarterly withdrawals of \$2,000 each are scheduled for the next 5 years.