

## Review Chapter 1, 2

### I) Population and sample

- 1) Government want in know how American citizens feel about the war in Iraq. They randomly select 500 citizens from each state and ask them about their feeling. What are the population and the sample?
- 2) You want to know the mean income of the subscribers to a particular magazine. You draw a random sample of 100 subscribers and determine that their mean income  $i$  is \$27,500. What are the population and the sample?
- 3) A sample of 50 patients is selected from among the patients admitted to the ER at a hospital, and it is found that 28% have no health insurance.
- 4) A city engineering wants to estimate the average weekly water consumption for single-family dwelling units in the city. 50 single-families are chosen randomly. And it is found that 25 families consumpt  $30\text{m}^3$  water per month.
- 5) A medical scientist wants to estimate the average length of time until the recurrence of a certain disease. He randomly choose 50 medical records of patients and carefully recorded length of time until the recurrence of a certain disease of each patient.

### II) Classify each set of data as discrete or continuous

- 1) The number of suitcases lost by an airline.
- 2) The height of corn plants.
- 3) The number of ears of corn produced.
- 4) The number of green M&M's in a bag.
- 5) The time it takes for a car battery to die.
- 6) The production of tomatoes by weight.
- 7) A 5 question quiz is given in a Math class. The number of correct answers on a student's quiz
- 8) The height of trees at a nursery
- 9) The length of time it takes for a light bulb to burn out

### III) Find probability of an event

- 1) In a class of 30 students, there are 17 girls and 13 boys. 12 are good students, and nine of these students are girls. If a student is chosen at random, what is the probability of choosing a boy or a good student?  
A.  $19/30$       B.  $11/15$       C.  $17/180$       D. None of the above
- 2) In the United States, 43% of people wear a seat belt while driving. If two people are chosen at random, what is the probability that both of them wear a seat belt?  
A. 86%      B. 18%      C. 57%      D. None of the above
- 3) In a school, 14% of students take drama and computer classes, and 67% take drama class, 30% take computer class. What is the probability that a student takes computer class

$$P(C|D') = P(C \text{ and } D')/P(D')$$

given that the student does not take drama class?

- A. 81%      B. 21%      C. 48%      D. None of the above

4) In a shipment of 100 televisions, 6 are defective. If a person buys two televisions from that shipment, what is the probability that at least one television are defective?

- A. 0.11697      B. 0.34723      C. 0.1467      D. None of the above

5) In a pet store, there are 6 puppies, 9 kittens, 4 gerbils and 7 parakeets. If a pet is chosen at random, what is the probability of choosing a puppy or a parakeet?

- A. 1.15/6      B. 1/2      C. 11/26      D. None of the above

6. The probability of a New York teenager owning a skateboard is 0.37, of owning a bicycle is 0.81 and of owning both is 0.36. If a New York teenager is chosen at random, what is the probability that the teenager owns a skateboard or a bicycle?

- A. 1.18      B. 0.7      C. 0.82      D. None of the above

7. A jar contains 6 red balls, 3 green balls, 5 white balls and 7 yellow balls. Two balls are chosen from the jar, with replacement. What is the probability that both balls chosen are green?

- A. 6/441      B. 2/49      C. 1/49      D. None of the above

8. A nationwide survey showed that 65% of all children in the United States dislike eating vegetables. If 4 children are chosen at random, what is the probability that all 4 dislike eating vegetables? (Round your answer to the nearest percent.)

- A. 18%      B. 26%      C. 2%      D. None of the above

9. On a math test, 5 out of 20 students got an A. If three students are chosen at random without replacement, what is the probability that all three got an A on the test?

- A. 1/114      B. 25/1368      C. 3/400      D. None of the above

10. In New York State, 48% of all teenagers own a skateboard and 39% of all teenagers own a skateboard and roller blades. What is the probability that a teenager owns roller blades given that the teenager owns a skateboard?

- A. 87%      B. 81%      C. 12%      D. None of the above

11. At a middle school, 18% of all students play football and basketball and 32% of all students play football. What is the probability that a student plays basketball given that the student plays football?

- A. 56%      B. 78%      C. 50%      D. None of the above

12. If an aircraft is present in a certain area, a radar correctly registers its presence with probability 0.99. If it is not present, the radar falsely registers an aircraft presence with probability 0.10. We assume that an aircraft is present with probability 0.05. What is the probability of false alarm (a false indication of aircraft presence), and the probability of missed detection (nothing registers, even though an aircraft is present)?

**Answer: 0.095 & 0.0005**

13. The phone lines to an airline reservation system are occupied 40% of the time. Assume that the events that the lines are occupied on successive calls are independent. Assume that 10 calls are placed to the airline.

- a) What is the probability that for exactly three calls the lines are occupied? (**answer: 0.215**)
- b) What is the probability that for at least one call the lines are not occupied? (**answer: 0.999**)

14. You enter a chess tournament where your probability of winning a game is 0.3 against half the players (call them type 1), 0.4 against a quarter of the players (call them type 2), and 0.5 against the remaining quarter of the players (call them type 3). You play a game against a randomly chosen opponent. What is the probability of winning?

**Answer\_ 0.375**

15. A test for a certain rare disease is assumed to be correct 95% of the time. If a person has the disease, the test results are positive with probability 0.95 and if the person does not have the disease, the test results are negative with probability 0.95. A random person drawn from a certain population has probability 0.001 of having the disease. Given that the person just tested positive, what is the probability of having the disease?

**Answer: 0.0187**

16. Three cards are drawn from an ordinary 52-card deck without replacement. Find the probability that none of the three cards is a heart.

**Answer: 0.414**

17. Let  $P(A) = 0.1$ ;  $P(B) = 0.2$ . Which of the followings are true?

- a) If A and B are independent, they are mutually exclusive.
- b) If A and B are disjoint, they are independent.
- c) If  $P(A \cup B) = 0.28$ , A and B are independent,
- d) If  $P(A \cup B) = 0.3$ , A and B are mutually exclusive.

18. In a certain county, 60% of registered voters are Republicans, 30% are Democrats, 10% are Independents. When those voters are asked about increasing military spending, 40% of Republicans opposed it, 65% of the Democrats opposed it, 55% of the Independents opposed it.

- a) What is the probability that a randomly selected voter in this county opposes increased military spending? (0.49)
  - b) A registered voter from our county writes a letter to the local paper ,arguing against increased military spending. What is the probability that this voter is a Democrat? (0.398)
19. Just for the heck of it Bob decides to take a test for AIDS and it comes back positive. The test is 99% effective (1%FP and FN). Suppose 0.3% of the population in Bob's "bracket" has AIDS. What is the probability that he has AIDS?( 0.23).
20. We toss a fair coin three times. Find the probability of an event that more heads than tails come up given that the first toss is a head. (3/4).
21.  
We roll a fair four-side die. If the result is 1 or 2, we roll one more but otherwise, we stop. What is the probability that the sum of our rolls is at least 4? (9/16).