1. The US government wants 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?

- Population: American citizens
- The sample: 500 citizens

2. Determine whether the given value is a statistic or a parameter.

a. A sample of 120 employees of a company is selected, and the average is found to be 37 years.

b. After inspecting all of 55,000 kg of meat stored at the Wurst Sausage Company, it was found that 45,000 kg of the meat was spoiled.

3. Is the experimental or observational study?

a. A marketing firm does a survey to find out how many people use a product. Of the one hundred people contacted, fifteen said they use the product. (observational)

b. A clinic gives a drug to a group of ten patients and a placebo to another group of ten patients to find out if the drug has an effect on the patients' illness. (experimental)

4. Identify the type of observational study.

a. A statistical analyst obtains data about ankle injuries by examining a hospital's records from the past 3 years. (retrospective)

b. A researcher plans to obtain data by following those in cancer remission since January of 2015. (propspective)

c. A town obtains current employment data by polling 10,000 of its citizens this month. (cross-sectional)

5. Identify the number as either continuous or discrete.

a. The total number of phone calls a sales representative makes in a month is 425. (discrete)

b. The average height of all freshmen entering college in a certain year is 68.4 inches. (continuous)

c. The number of stories in a Manhattan building is 22. (discrete)

6. Classify each set of data as discrete or continuous.

a. The number of suitcases lost by an airline. (discrete)

b. The height of corn plants. (continuous)

c. The number of ears of corn produced. (discrete)

d. The time it takes for a car battery to die. (continuous)

7. Fill in the bank

a. Observational Study is a basic method of ...collecting data

b. Designed Study is a basic method of ...

c. Retrospective Study, observational study and designed experiment are three basis methods of ...

d. A designed experiment is a method of ...

8. Each of the possible five outcomes of a random experiment is equally likely. The sample space is {a, b, c, d, e}. Let A denote the event {a, b}, and let B denote the event {c, d, e}. Determine the following:

a. P(A) =2/5 b. P(B) =3/5 c. P(A') =3/5 d. P(AUB)=1 e. P(A|B) =0

9. The Ski Patrol at Criner Mountain Ski Resort has determined the following probability distribution for the number of skiers that are injured each weekend:

Injured Skiers	0	1	2	3	4
Probability	0.05	0.15	0.4	0.3	0.1

What is the probability that the number of injuries per week is at most 3?

P(x<=3)=1-P(4)=0.9

10. 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.

a. If a New York teenager is chosen at random, what is the probability that the teenager owns a skateboard or a bicycle? 0.82

b. If a New York teenager is chosen at random, what is the probability that the teenager owning a skateboard but not owning a bicycle. 0.01

c. Find the probability that the teenager owns a bicycle given that the teenager owns a skateboard. 0.36/0.37

11. Let $P(A) = 0.4, P(B) = 0.5$ and $P(A \cup B) = 0.7$. Find:

a. $P(AB)$ b. $P(\bar{A}B)$ c. $P(B|A)$

12. Samples of a cast aluminum part are classified on the basis of surface finish (in micro-inches) and length measurements. The results of 100 parts are summarized as follows:

		Length	
Surface Finish		Excellent	Good
	Excellent	80	2
	Good	10	8

Let A denote the event that a sample has excellent surface finish, and let B denote the event that a sample has excellent length. Determine:

a. P(A), P(B) b. P(AB), P(A+B) c. P(A|B), P(B|A)

13. A batch of 350 samples of rejuvenated mitochondria contains eight that are mutated (or defective). Two are selected, at random, without replacement from the batch.

a. What is the probability that the second one selected is defective given that the first one was defective?

b. What is the probability that both are defective?

c. What is the probability that both are acceptable?

14. Suppose that A and B are independent events, P(A) = 0.4 and P(B) = 0.5. Determine the following:

a. P(AB) and P(AB')

b. P(A+B) and P(B|A)

15. The probability that a lab specimen contains high levels of contamination is 0.1. Five samples are checked, and the samples are independent.

a. What is the probability that none contain high levels of contamination?

b. What is the probability that exactly one contains high levels of contamination?

c. What is the probability that at least one contains high levels of contamination?

16. The sample space of a random experiment is {a, b, c, d, e, f}, and each outcome is equally likely. A random variable is defined as follows:

Outcome	a	b	c	d	e	f
X	0	0	1.5	1.5	2	3

Use the probability mass function to determine the following probabilities:

a. P(X=1.5) b. P(0.5<X<2.7) c. P(0<=X<2) d. P(X=0 or X=2)

17. Verify that the following functions are probability mass functions, and determine the requested probabilities.

x	-2	-1	0	1	2
f(x)	0.2	0.4	0.1	0.2	0.1

a. P(X<=2) b. P(X>-2) c. P(-1<=X or x=2)

d. Compute E(X), V(X), sigma_X

18. The thickness of wood paneling (in inches) that a customer orders is a random variable with the following cumulative distribution function:

$$F(x)=\begin{cases}0 & ,x<1/8\\ 0.2 & ,1/8\le x<1/4\\ 0.9 & ,1/4\le x<3/8\\ 1 & ,3/8\le x\end{cases}$$

Determine the following probabilities:

a. P(X<=1/4) b. P(X<=5/16) c. P(X>1/2) d. Compute E(X), V(X)

19. Verify that the following functions are probability mass functions, and determine the requested probabilities.

$$f(x)=\frac{2x+1}{25}, x=0,1,2,3,4$$

a. P(X<=1) b. P(2<=X<=4) c. Compute E(X), V(X) and sigma_X

20. Let the random variable X have a discrete uniform distribution on the integers 1<=X<=3. Determine the mean and variance of X.

21. The random variable X has a binomial distribution with n = 10 and p = 0.5. Determine the following probabilities:

a. P(X=5) b. P(X<=2) c. P(X>7) d. E(X), V(X)

22. A multiple-choice test contains 25 questions, each with four answers. Assume that a student just guesses on each question.

a. What is the probability that the student answers more than 20 questions correctly?

b. What is the probability that the student answers fewer than 5 questions correctly?

23. Suppose that the random variable X has a geometric distribution with p = 0 5.

a. Determine the following probabilities: P(X=4), P(X>3).

b. Determine the mean and variance of X.

24. Suppose that X is a negative binomial random variable with $p = 0.2$ and $r = 4$. Determine the following:

a. $E(X)$, $V(X)$ b. $P(X=3)$, $P(X=5)$ c. $P(X>5)$

25. A batch of parts contains 100 from a local supplier of tubing and 200 from a supplier of tubing in the next state. If four parts are selected randomly and without replacement.

a. What is the probability they are all from the local supplier?

b. What is the probability that two or more parts in the sample are from the local supplier?

26. On average, 3 traffic accidents per month occur at a certain intersection. What is the probability that in any given month at this intersection?

a. Exactly 5 accidents will occur?

b. Fewer than 3 accidents will occur?

c. At least 2 accidents will occur?

27. The number of flaws in bolts of cloth in textile manufacturing is assumed to be Poisson distributed with a mean of 0.1 flaw per square meter.

a. What is the probability that there are two flaws in one square meter?

b. What is the probability that there is one flaw in 10 square meters?

c. What is the probability that there are at least two flaws in 10 square meters of cloth?

d. What is the probability that there are no flaws in 20 square meters?