1. If the median is smaller than the mean, the data is left-skewed.
A. False.
B. True
2. If X is a continuous random variable, the probability at a specific value is f(x).
False
3. If we let X be a random variable and we let Y=log($X2$)+cos(π). Is Y is a random
variable?
A. True.
B. True.
4. Consider the following probability mass function:
Is this a legitimate distribution?
A. False.
B. **True**.
5. If X and Y are disjoint random variables, then X and Y are always independent.
A. **False.**
B. True.
6. If two events A and B are independent, then their complements Ac and Bc are also independent.
A. **False**.
B. True.
7. If events A and B are mutually exclusive, then the probability of their union is equal to the sum of their individual probabilities.
A. False.
B. **True.**
8. If the probability of an event A is 0, then the event A cannot occur.
A. False.
B. **True.**
9. The variance of a random variable X is always positive.
A. False.
B. **True.**
10. If the variance of a random variable X is zero, then X must be a constant.
A. False.
B. **True.**
Circle the correct answers.
Questions 11-23 are multiple choice questions.
Each question is worth 4 points.
11. Which of the following is a categorical variable?
A. Age of a student.
B. Number of students in a class.
C. Student's major.
D. None of the above.
12. Which of the following leads to a response that is an ordinal variable?
A. What are the types of trees in the National Forest?
B. What letter grade do you expect to receive in this course?
C. What is your gender?
D. None of the above.
13. Let M = { Student is Male }. Let F = { Student is Female }. Let T = { Student is over 6 feet tall }. Suppose 40% of the students are male and 60% are female. If P(T|M) = 0.12 and P(T|F) = 0.02. What is the probability that a randomly selected student is over 6 feet tall?
A. 0.94
B. 0.08
C. 0.06
D. 0.33
Use the following to answer Question 14.
Here are the histograms of two continuous variables, denoted by x1 and x2.
14. Which of the following statements are incorrect? Select all that apply.
A. Histogram of x1 is unimodal and almost symmetric.
B. Histogram of x2 is skewed to the left.
C. Looking at histogram of x1, you expect the mean and median of x1 to be similar.
D. Looking at histogram of x2, you expect the mean and median of x2 to be similar.
15. Suppose 80% of people regularly eat breakfast, 89% eat lunch, and 91% ate either breakfast or lunch. Given that a randomly selected person ate breakfast today, what is the probability that this person also ate lunch?(Let B represent a person who ate Breakfast and L represents a person who ate Lunch.)
A. P(B|L)=0.876
B. P(B|L)=0.975
C. P(L|B)=0.876
D. P(L|B)=0.975
16. Consider the following population:
What is the probability that a randomly selected person does not have a nominal amount of body fat?
A. 0.429
B. 0.571
C. 0.296
D. 0.704.
17. Consider the following population:
That is, P(X=x) = f(x).
A. False.
B. True.

Given that a person is overweight, what is the probability that it is a male?
A. P(M|OW)=0.545.
B. P(M|OW)=0.594.
C. P(M|OW)=0.405.
D. P(M|OW)=0.295.
Use the following to answer Questions 18.
A sample was taken of the metabolic rates of men participating in a study regarding diets.
The following is a boxplot of the scores.
18. Based on this boxplot, which of the following statements is true?
A. The distribution of metabolic rates is fairly symmetric.
B. About half the rates were over 1550.
C. Nobody had a rate under 1200.
D. All of the above
19. In a certain population of the parasite Trypanosoma, the lengths of individuals are
distributed as indicated by the density curve shown here.
Let X the length of an individual trypanosome chosen at random from the population.
What is the P [(20 < X < 30) ∪ (X > 25)]?
A. 0.41.
B. 0.62.
C. 0.65.
D. 0.21.
20. Consider a fair six-sided die where the even-numbered faces are colored purple and the
odd-numbered faces are colored green. Let event A be rolling a green face. Let event B
be rolling a 6. These two events are
A. Mutually exclusive, but not independent.
B. independent, but not mutually exclusive.
C. Not mutually exclusive, and not independent.
D. Mutually exclusive and independent.
21. Each year starts on one of the seven days (Sunday through Saturday). Each year is
either a leap year (i.e., it includes February 29) or not. How many different calendars are
possible for a year?
A. 7.
B. 14.
C. 21.
D. 28.
22. The probability that a patient recovers from a delicate heart operation is 0.9. What is the
probability that exactly 2 of the next 3 patients who have this operation survive?
A. 0.243.
B. 0.729.
C. 0.027.
D. 0.001.

1. The expectation of a sum of two random variables is equal to the sum of their expectations.
A. False.
B. True.
2. The expectation of a random variable is always equal to its mode.
A. False.
B. True.
3. If X and Y are independent random variables, then E[XY] = E[X]E[Y].
A. False.
B. True.
4. The expected value of a random variable is always one of the possible values that
the random variable can take.
A. False.
B. True.
5. If two random variables X and Y are uncorrelated, then they must be independent.
A. False.
B. True.
6. If the correlation coefficient between two random variables X and Y is zero, then
X and Y must be independent.
A. False.
B. True.
7. The standard normal distribution has a mean of 1 and a standard deviation of 0.
A. False.
B. True.
8. In a Poisson distribution, the mean and variance are different.
A. False.
B. True.
9. The gamma distribution is a special case of the exponential distribution when the
shape parameter is equal to 1.
A. False.
B. True.
10. In the geometric distribution, the probability of success increases as the number of trials
increases.
A. False.
B. True.
11. An assembly line, on average, produces 1 defective part for every 100 parts that roll out
of line. What is the average number of defects for a group of 20 parts? what distribution
does the problem follow?
A. Geometric.
B. Hypergeometric.
C. Binomial.
D. Poisson.
12. A quality control expert at a large factory estimates that 10% of all batteries produced
are defective. If he takes a random sample of 15 batteries, what is the probability that
exactly two are defective? What distribution would we use to find this probability?
A. Binomial
B. Hypergeometric.
C. Poisson.
D. Geometric.
13. Let μ=5 and σ = 0.25. find the z-value(i.e. z-score) of x=4.80?
A. 3.2
B. 0.8
C. -0.8
D. -3.2
14. Consider the following joint probability density function of the random variables X and
Y :
Find E(X).
A. 1.9512.
B. 2.2222.
C. 2.5672.
D. 3.1234.
15. From problem 14, Find E(Y).
A. 0.0123
B. 0.0975
C. 1.4815
D. 1.9713
16. The probabilities are 0.4, 0.2, 0.2 and 0.2, respectively, that a delegate to a certain
convention arrived by air, bus, automobile, or train. Consider 11 randomly selected
delegates at this convention. What is the probability that from these 11 delegates, 5
arrived by air, 3 arrived by bus, 1 arrived by automobile, and 2 arrived by train?
A. 0.0182
B. 0.0384
C. 0.0576
D. 0.0945
17. The average number of field mice per acre in a wheat field is estimated to be 15. Find the
probability that fewer than 10 mice are found on a given acre.
A. 0.1185.
B. 0.2018.
C. 0.3074.
D. 0.4078.
Use the following to answer Questions 18-19.
Let $Y1$, $Y2$, $Y3$, be random variables. Also let :
18. Find The expected value of U = $-5Y1 + 5Y2 + 6Y3$.
A. 30. Search this one up fam
B. 37.
C. 42.
D. 49.
19. Find The variance of V = $-5Y1 + 5Y2$.
A. 90.
B. 112.
C. 121.
D. 134.
There are 15 different marbles and 3 jars. Suppose you are throwing the marbles in the jars
and there is a 20%, 50% and 30% chance of landing a marble in jars 1, 2 and 3, respectively.
20. What is the probability of landing 4, 6 and 5 marbles in jars 1, 2 and 3 respectively?
A. 0.0123.
B. 0.0237.
C. 0.0383.
D. 0.0513.
21. Suppose that out of the 15 marbles 7 are red and 8 are blue. If we randomly select a
sample of size 5, what is the probability that we will have 3 blue marbles?
A. 0.2547.
B. 0.3916.
C. 0.5146.
D. 0.6374.
22. Suppose we will throw marbles at the jars, until we have landed three (regardless of
color) in jar 1. What is the probability that we will need to throw ten marbles to achieve
this?
A. 0.0604.
B. 0.1284.
C. 0.1924.
D. 0.2513.
23. The finished inside diameter of a piston ring is normally distributed with a mean of 10
centimeters and a standard deviation of 0.03 centimeter. What proportion of rings will
have inside diameters exceeding 9.95 centimeters?
A. 0.0478.
B. 0.0597.
C. 0.0701.
D. 0.0812.
24. In a certain city, the daily consumption of electric power, in millions of kilowatt-hours, is
a random variable X having a gamma distribution with mean μ = 10 and variance σ2 =
30. Find the values of α and β.
A. α = 10/3 and β=3.
B. α = 10 and β=3.
C. α = 20 and β=6.
D. α = 10/3 and β=9.
25. Suppose that the time, in hours, taken to repair a heat pump is a random variable X
having a gamma distribution with parameters α = 2 and β= 1/2. What is the probability
that the next service call will require at most 1 hour to repair the heat pump?
A. 0.2317.
B. 0.3326.
C. 0.4671.
D. 0.5940.
1. A network administrator records the total traffic over the network each day for a
month. He then shares the results with his supervisor. This is an example of Observational study.
A. False.
B. True.
2. Let X be the number of bits received in error, out of 400 sent, over a communication channel. This distribution is Poisson distribution.
A. False.
B. True.
3. Correlation provides information about linear relationships.
A. False.
B. True.
4. In a Poisson distribution, the mean and variance are same.
A. False.
B. True.
5. The width of a confidence interval increases as the level of confidence increases.
A. False.
B. True.
6. Causation cannot be directly inferred from an observational study between two variables.
A. False.
B. True.
The number of ways to rearrange the letters of VIRGINIA is:

8! / (2! * 2!) = 20,160