Name:

AP Statistics Chapter 6 Practice MC Test

Multiple Choice

Identify the choice that best completes the statement or answers the question.

1. Which of the following random variables should be considered continuous?
   a. The number of CD's a randomly chosen person has
   b. The number of sisters a randomly chosen person has
   c. The number of goals scored in a randomly chosen soccer game
   d. The number of tacos ordered by a randomly chosen Del Taco customer.
   e. None of the above

2. A psychologist studied the number of puzzles subjects were able to solve in a five-minute period while listening to soothing music. Let X be the number of puzzles completed successfully by a subject. X had the following distribution:

X	1	2	3	4
Probability	0.2	0.4	0.3	0.1

   Using the above data, the mean μ of X is
   a. 2.0
   b. 2.3
   c. 2.5
   d. 3.0
   e. The answer cannot be computed from the information given.

3. A random variable X has a probability distribution as follows:

X	0	1	2	3
P(X)	2k	3k	13k	2k

   Then the probability that *P*(X = 2) is equal to
   a. 0.90.
   b. 0.25.
   c. 0.65.
   d. 0.15.
   e. 1.00.

4. Suppose X is a random variable with mean μ. Suppose we observe X many times and keep track of the average of the observed values. The law of large numbers says that
   a. The value of μ will get larger and larger as we observe X.
   b. As we observe X more and more, this average and the value of μ will get larger and larger.
   c. This average will get closer and closer to μ as we observe X more and more often.
   d. As we observe X more and more, this average will get to be a larger and larger multiple of μ.
   e. None of the above

5. A factory makes silicon chips for use in computers. It is known that about 90% of the chips meets specifications. Every hour a sample of 18 chips is selected at random for testing. Assume a binomial distribution is valid. Suppose we collect a large number of these samples of 18 chips and determine the number meeting specifications in each sample. What is the approximate mean of the number of chips meeting specifications?
   a. 16.20
   b. 1.62

c. 4.02
d. 16.00
e. The answer cannot be computed from the information given.

6. Twenty percent of all trucks undergoing a certain inspection will fail the inspection. Assume that trucks are independently undergoing this inspection, one at a time. The expected number of trucks inspected before a truck fails inspection is
a. 2
b. 4
c. 5
d. 20
e. The answer cannot be computed from the information given

7. Two percent of the circuit boards manufactured by a particular company are defective. If circuit boards are randomly selected for testing, the probability it takes 10 circuit boards to be inspected before a defective board is found is
a. .0167
b. .9833
c. 0.1829
d. 0.8171
e. The answer cannot be computed from the information given

8. Two percent of the circuit boards manufactured by a particular company are defective. If circuit boards are randomly selected for testing, the probability that the number of circuit boards inspected before a defective board is found is greater than 10 is
a. 1.024×10^7
b. 5.12×10^7
c. 0.1829
d. 0.8171
e. The answer cannot be computed from the information given

9. It has been estimated that about 30% of frozen chickens contain enough salmonella bacteria to cause illness if improperly cooked. A consumer purchases 12 frozen chickens. What is the probability that the consumer will have exactly 6 contaminated chickens?
a. 0.961
b. 0.118
c. 0.882
d. 0.039
e. 0.079

10. It has been estimated that about 30% of frozen chickens contain enough salmonella bacteria to cause illness if improperly cooked. A consumer purchases 12 frozen chickens. What is the probability that the consumer will have more than 6 contaminated chickens?
a. 0.961
b. 0.118
c. 0.882
d. 0.039
e. 0.079

AP Statistics Practice Free Response

1. Patients receiving artificial knees often experience pain after surgery. The pain is measured on a subjective scale with possible values of 1 to 5. Assume that X is a random variable representing the pain score for a randomly elected patient. The following table gives part of the probability distribution for X.

X	1	2	3	4	5
P(X)	.1	.2	.3	.3	

   (a) Find P(X = 5).

   (b) Find the probability that the pain score is less than 3.

   (c) Find the probability that the pain score is greater than 3.

   (d) Find the mean μ for this distribution.

2. A quarterback completes 44% of his passes.
   (a) What is the probability that the quarterback throws 3 incomplete passes before he has a completion?
   (b) What is the probability that the quarterback throws his first completion in no more than 3 attempts?
   (c) How many passes, on average, can the quarterback expect to throw before he completes his first pass?
   (d) Use two methods to determine the probability that it takes more than 5 attempts before he completes a pass.

3. A headache remedy is said to be 85% effective in curing headaches caused by simple nervous tension. An investigator tests this remedy on 8 randomly selected patients suffering from nervous tension.
   (a) Find the probability that the remedy works for 7 of the patients.

   (b) Find the probability that the remedy works for more than 6 of the patients.

   (c) Find the probability that the remedy works for less than half of the patients.

   (d) What is the expected value for the number of people in the experiment who have success with the remedy?

Name:
Score: 0 / 10 points (0%)

AP Statistics Chapter 6 MC Test

Multiple Choice

Identify the choice that best completes the statement or answers the question.

___ 1. Which of the following random variables should be considered continuous?
a. The number of CD's a randomly chosen person has
b. The number of sisters a randomly chosen person has
c. The number of goals scored in a randomly chosen soccer game
d. The number of tacos ordered by a randomly chosen Del Taco customer.
e. None of the above

ANSWER: E
Since responses a-d describe variables that can only take whole number values, each is a discrete random variable. So the answer is **e) none of the above**.
POINTS: 0 / 1

___ 2. A psychologist studied the number of puzzles subjects were able to solve in a five-minute period while listening to soothing music. Let X be the number of puzzles completed successfully by a subject. X had the following distribution:

X	1	2	3	4
Probability	0.2	0.4	0.3	0.1

Using the above data, the mean μ of X is
a. 2.0
b. 2.3
c. 2.5
d. 3.0
e. The answer cannot be computed from the information given.

ANSWER: B
X is a discrete random variable and the formula for the mean is
$\sum x_i \bullet p_i$ = 1(0.2) + 2(0.4) + 3(0.3) + 4(0.1) = **2.3**.
POINTS: 0 / 1

___ 3. A random variable X has a probability distribution as follows:

X	0	1	2	3
P(X)	2k	3k	13k	2k

Then the probability that *P*(X = 2) is equal to
a. 0.90.
b. 0.25.
c. 0.65.
d. 0.15.
e. 1.00.

ANSWER: C
X is a discrete random variable. The sum of the probabilities in the distribution must add up to 1. So, using Algebra, we get

2k + 3k + 13k + 2k = 1

20k = 1
k = 1 / 20 = .05.

Now compute the probability distribution for k = .05.

X	0	1	2	3
P(X)	.1	.15	.65	.1

Therefore, the $P(X = 2) = 13(.05) =$ **.65**.

POINTS: 0 / 1

____ 4. Suppose X is a random variable with mean μ. Suppose we observe X many times and keep track of the average of the observed values. The law of large numbers says that

a. The value of μ will get larger and larger as we observe X.
b. As we observe X more and more, this average and the value of μ will get larger and larger.
c. This average will get closer and closer to μ as we observe X more and more often.
d. As we observe X more and more, this average will get to be a larger and larger multiple of μ.
e. None of the above

ANSWER: C

The Law of Large Numbers tells us that the sample mean will approach the population mean as the sample size increases to infinity.

POINTS: 0 / 1

____ 5. A factory makes silicon chips for use in computers. It is known that about 90% of the chips meets specifications. Every hour a sample of 18 chips is selected at random for testing. Assume a binomial distribution is valid. Suppose we collect a large number of these samples of 18 chips and determine the number meeting specifications in each sample. What is the approximate mean of the number of chips meeting specifications?

a. 16.20
b. 1.62
c. 4.02
d. 16.00
e. The answer cannot be computed from the information given.

ANSWER: A

This is a Binomial setting with n=18 and p=.90. The formula for the mean of a Binomial random variable is simply $\mu = n \cdot p = 18 \cdot 0.9 = 16.2.$

POINTS: 0 / 1

____ 6. Twenty percent of all trucks undergoing a certain inspection will fail the inspection. Assume that trucks are independently undergoing this inspection, one at a time. The expected number of trucks inspected before a truck fails inspection is

a. 2
b. 4
c. 5
d. 20
e. The answer cannot be computed from the information given

ANSWER: C

This is a Geometric setting with p=.20. The formula for the mean of a Geometric random variable is simply $\mu = \frac{1}{p} = \frac{1}{.2} = 5.$

POINTS: 0 / 1

7. Two percent of the circuit boards manufactured by a particular company are defective. If circuit boards are randomly selected for testing, the probability it takes 10 circuit boards to be inspected before a defective board is found is

a. .0167
b. .9833
c. 0.1829
d. 0.8171
e. The answer cannot be computed from the information given

ANSWER: A

This is a Geometric setting with p=.02 and n=10. The formula for geometric probability is $P(x = n) = (1-p)^{n-1} \bullet p = (.98)^9(.02) = .0167$.

On the calculator, this is found by *geometpdf(.2,10).*

POINTS: 0 / 1

8. Two percent of the circuit boards manufactured by a particular company are defective. If circuit boards are randomly selected for testing, the probability that the number of circuit boards inspected before a defective board is found is greater than 10 is

a. 1.024 × 10^7
b. 5.12 × 10^7
c. 0.1829
d. 0.8171
e. The answer cannot be computed from the information given

ANSWER: D

This is a Geometric setting with p=.02 and n=10. The formula for geometric probability is $P(x > n) = (1-p)^n = (.98)^{10} = .8171$.

Alternatively, this can be found on the calculator by *1 - geometpdf(.2,10).*

POINTS: 0 / 1

9. It has been estimated that about 30% of frozen chickens contain enough salmonella bacteria to cause illness if improperly cooked. A consumer purchases 12 frozen chickens. What is the probability that the consumer will have exactly 6 contaminated chickens?

a. 0.961
b. 0.118
c. 0.882
d. 0.039
e. 0.079

ANSWER: E

This is a Binomial setting with n=12 and p=.30. The formula for Binomial probability is $P(X = k) = \begin{pmatrix} n \\ k \end{pmatrix} p^k (i-p)^{n-k}$ which here gives

$$P(X = 6) = \begin{pmatrix} 12 \\ 6 \end{pmatrix} (.3)^6 (.7)^6 = .079.$$

POINTS: 0 / 1

10. It has been estimated that about 30% of frozen chickens contain enough salmonella bacteria to cause illness if improperly cooked. A consumer purchases 12 frozen chickens. What is the probability that the consumer will have more than 6 contaminated chickens?

a. 0.961
b. 0.118

c. 0.882
d. 0.039
e. 0.079

ANSWER: D

This is a Binomial setting with n=12 and p=.30. The formula for greater than in Binomial probability is $P(X > k) = 1 - binomialcdf(n, p, k)$ which here gives

$P(X > 6) = 1 - binomialcdf(12, .3, 6) = .039$.

POINTS: 0 / 1

ANSWERS - AP Statistics Practice Free Response   Chapters 6

1. Patients receiving artificial knees often experience pain after surgery. The pain is measured on a subjective scale with possible values of 1 to 5. Assume that X is a random variable representing the pain score for a randomly elected patient. The following table gives part of the probability distribution for X. DISCRETE RANDOM VARIABLE

X	1	2	3	4	5
P(X)	.1	.2	.3	.3	

(a) 1 – (.1 + .2 + .3 +.3) = 1 - .9 = .1.

(b) .1 + .2 = .3.

(c) .3 + .1 = .4.

(d) μ = 1(.1) + 2(.2) + 3(.3) + 4(.3) + 5(.1) = 3.1.

2. A quarterback completes 44% of his passes. GEOMETRIC

(a) $P(x=4)=(.56)^3(.44)=.078$

(b) $P(x \le 3)=geometcdf(.44,3) = .824$

(c) $\mu=\frac{1}{p}=\frac{1}{.44}=2.273$

(d) $P(x>5)=(.56)^5=.055$ OR $P(x>5)=1-geometcdf(.44,5) = .055$

3. A headache remedy is said to be 85% effective in curing headaches caused by simple nervous tension. An investigator tests this remedy on 8 randomly selected patients suffering from nervous tension. BINOMIAL

(a) $P(x=7)=\frac{8!}{7!1!}(.85)^7(.15)^1=.385$

(b) $P(x>6)=1-binomcdf(8,.85,6) = .657$

(c) $P(x<4)=binomcdf(8,.85,3) = .003$

(d) $\mu=np=8(.85)=6.8$