Key   B

BIRZEIT UNIVERSITY
MATHEMATICS DEPARTMENT

Second Exam   Stat. 236   Fall 2010/2011
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Name(بالعربية)..Number...
Instructor...Sec............
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Discrete Random Variable

$$E(X) = \mu = \sum x f(x) \qquad Var(X) = \sum (x-\mu)^2 f(x) = E(X^2) - (E(X))^2$$

Binomial Probability Distribution

$$P(X=x) = \binom{n}{x} p^x (q)^{n-x} \qquad E(X) = np, \ \sigma(X) = \sqrt{np(1-p)}$$

Poisson Probability   **Uniform Distribution**

$$f(x) = \frac{\mu^x e^{-\mu}}{x!} \qquad\qquad f(x) = \begin{cases} \dfrac{1}{b-a}, a \le x \le b \\ 0 \end{cases}$$

Hypergeometric Probability Distribution   **Exponential Distribution**

$$P(X=x) = \frac{\binom{r}{x}\binom{N-r}{n-x}}{\binom{N}{n}} \qquad\qquad f(x) = \frac{1}{\mu} e^{\frac{-x}{\mu}}$$

Sampling Distribution of the mean   **Sampling Distribution of the proportion**

$$E(\bar{x}) = \mu, \ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} \text{ or } \sigma_{\bar{x}} = \sqrt{\frac{N-n}{N-1}} \frac{\sigma}{\sqrt{n}} \qquad E(\bar{p}) = p, \ \sigma_{\bar{p}} = \sqrt{\frac{p(1-p)}{n}}$$

Bonus

1. معدل التوجيهي:.................   2. نوع التوجيهي: أ) علمي   ب. أدبي   ج) غير ذلك

3.. نوع المدرسة الثانوية: أ) حكومية   ب) خاصة   ج) غير ذلك   4. نوع الالتحاق بالجامعة: أ) عادي   ب) موازي

5. الكلية ا) التجارة   ب)الادارة

6. عدد ساعات الدراسة أسبوعيا على مساق الاحصاء Stat236:.................   7.. عدد ساعات الدراسة أسبوعيا على كل
المساقات........

1

Part I: Circle the correct answer

1. The student body of a large university consists of 60% female students. A random sample of 8 students is selected. What is the probability that among the students in the sample **at least 6 are male?**
   a. 0.0413
   b. ⌐.0079
   c. 0.000
   ⓓ 0.0499

2. The following represents the probability distribution for the daily demand of microcomputers at a local store.

Demand	Probability
0	0.2
1	0.1
2	0.3
3	0.2
4	0.2

   The expected daily demand is
   ⓐ 2.1
   b. 2.2
   c. 2, since it has the highest probability
   d. of course 4, since it is the largest demand level

3. An experiment consists of making 80 telephone calls in order to sell a particular insurance policy. We are interested in the number of insurance policies sold, the random variable in this experiment is a
   a. continuous random variable
   b. complex random variable
   c. simplex random variable
   ⓓ discrete random variable

4. When dealing with the number of occurrences of an event over a specified interval of time or space, the appropriate probability distribution is a
   a. binomial distribution
   ⓑ Poisson distribution
   c. normal distribution
   d. hypergeometric probability distribution.

(5, 6, and 7)The assembly time for a product is uniformly distributed between 6 to 10 minutes.

5. The probability density function has what value in the interval between 6 and 10?
   a. 5.00
   b. 4.00
   ⓒ 0.25
   d. zero

6. The probability of assembling the product in less than 6 minutes is
   ⓐ zero
   b. 0.50
   c. 0.55
   d. 1

2

7. The variance of assembly time (in minutes) is approximately
   - a. 1.3333
   - b. 1.1547
   - c. 0.1111
   - d. 0.5773

8. For air travelers, one of the biggest complaints is of the waiting time between when the airplane taxis away from the terminal until the flight takes off. This waiting time is known to have a skewed-right distribution with a mean of 10 minutes and a standard deviation of 8 minutes. Suppose 100 flights have been randomly sampled. Describe the sampling distribution of the mean waiting time between when the airplane taxis away from the terminal until the flight takes off for these 100 flights.
   - a. Distribution is skewed-right with mean = 10 minutes and standard error = 0.8 minutes.
   - b. Distribution is skewed-right with mean = 10 minutes and standard error = 8 minutes.
   - c. Distribution is approximately normal with mean = 10 minutes and standard error = 0.8 minutes.
   - d. Distribution is approximately normal with mean = 10 minutes and standard error = 8 minutes.

9. At a computer manufacturing company, the actual size of computer chips is normally distributed with a mean of 1 centimeter and a standard deviation of 0.1 centimeter. A random sample of 12 computer chips is taken. What is the standard error for the sample mean?
   - a. 0.029
   - b. 0.050
   - c. 0.091
   - d. 0.120

10. Major league baseball salaries averaged $1.5 million with a standard deviation of $0.8 million in 1994. Suppose a sample of 100 major league players was taken. Find the approximate probability that the average salary of the 100 players exceeded $1 million.
   - a. Approximately 0
   - b. 0.2357
   - c. 0.7357
   - d. Approximately 1

11. What type of probability distribution will the consulting firm most likely employ to analyze the insurance claims in the following problem?

   An insurance company has called a consulting firm to determine if the company has an unusually high number of false insurance claims. It is known that the industry proportion for false claims is 3%. The consulting firm has decided to randomly and independently sample 100 of the company's insurance claims. They believe the number out of these 100 that are false will yield the information the company desires.
   - a. Binomial distribution.
   - b. Poisson distribution.
   - c. Hypergeometric distribution.
   - d. None of the above.

3

12. The key difference between the binomial and hypergeometric distribution is that with the hypergeometric distribution
    a. the probability of success must be less than 0.5
    b. the probability of success changes from trial to trial
    c. the trials are independent of each other
    d. the random variable is continuous
13. A professor receives, on average, 24.7 e-mails from students the day before the midterm exam. To compute the probability of receiving at least 10 e-mails on such a day, he will use what type of probability distribution?
    a. Binomial distribution.
    b. Poisson distribution.
    c. Hypergeometric distribution.
    d. Exponential distribution.
14. Four hundred people were asked whether gun laws should be more stringent. Three hundred said "yes," and 100 said "no." The point estimate of the proportion in the population who will respond "no" is
    a. 300
    b. approximately 300
    c. 0.75
    d. 0.25
15. The following data was collected from a simple random sample of a population

    13   15   14   16   12
    The point estimate of the population mean

    a. cannot be determined, since the population size is unknown
    b. is 4
    c. is 5
    d. is 14

Part: Show all your work

16. A life insurance company has determined that each week an average of 10 claims is filed in one of its branch.

5 points a. What is the probability that during the next week exactly 5 claims will be filed?

5 // b. What is the expected number of claims in two weeks?

(a) $\mu = .10$, $x = 5$

$P(X=5) = \dfrac{10^5 e^{-10}}{5!} = 0.0378$

(b) $\mu = (2)(10) = 20$ claims

17. The average price of personal computers manufactured by MNM Company is $1,200 with a standard deviation of $200. Furthermore, it is known that the computer prices manufactured by MNM are normally distributed. **DO NOT ROUND YOUR NUMBERS.**

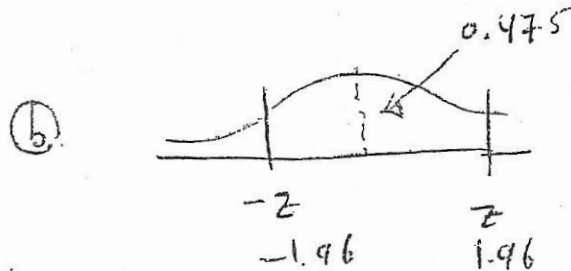**5 points** a. What is the probability that a randomly selected computer will have a price of at least $1,500?

5 // c. What are the **minimum** and the **maximum** values of the middle 95% of computer prices?

5 // d. If 513 of the MNM computers were priced at or below $647.80, how many computers were produced by MNM?

$\mu = 1200$, $\sigma = 200$

(a) $P(X > 1500) = P\left(Z > \dfrac{1500 - 1200}{200}\right) = P(Z > 1.5)$

$= 0.0668$

(b)

0.475

$0.475 \Rightarrow Z = 1.96$

$-Z \qquad Z$
$-1.96 \qquad 1.96$

$\pm 1.96 = \dfrac{X - 1200}{200} \Rightarrow$ $X = 808$ to $X = 1592$

(c) $P(X < 647.8) = P(Z < -2.76) = 0.0029 \longrightarrow 513$

$\Rightarrow$ # of chips = 176897