

Answer Key 3

Math 324: Mathematical Statistics

Name: _____

Exam 1; Feb. 18, 2005

1. • b c d e

2. a • c d e

3. a b c • e

4. a b • d e

5. a • c d e

6. a b c d •

7. a • c d e

Math 324: Mathematical Statistics

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1.

a	b	c	d	e
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2.

a	b	c	d	e
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3.

a	b	c	d	e
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4.

a	b	c	d	e
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5.

a	b	c	d	e
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6.

a	b	c	d	e
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7.

a	b	c	d	e
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1. If $H_0 : \mu = 100$ is to be tested against $H_1 : \mu < 100$ at the $\alpha = .05$ level of significance based on a sample of size n from a normal distribution where $\sigma = 10$, what is the smallest value of n that will make the power equal to $.7$ when $\mu = 97$.

- (a) 52 (b) 55 (c) 47
(d) 57 (e) None of the others

2. A random sample of size 2, Y_1 and Y_2 is drawn from the pdf,

$$f_Y(y; \theta) = 2\frac{y}{\theta^2}, 0 < y < \theta.$$

Find c so that $c(Y_1 + Y_2)$ is an unbiased estimator for θ .

- (a) $\frac{1}{4}$ (b) $\frac{3}{4}$ (c) $\frac{1}{3}$
(d) $\frac{1}{2}$ (e) None of the others

3. Suppose X_1, \dots, X_{200} denote the outcomes in a series of independent trials, where $P(\text{success in the } i\text{-th trial})=p$, and $P(\text{failure in the } i\text{-th trial})=1-p$. Suppose $H_0 : p = .35$ is to be tested against $H_1 : p < .35$ at the .05 level of significance. What is the smallest number of failures that will cause us to reject H_0 .

- (a) 139 (b) 138 (c) None of the others
(d) 142 (e) 140

4. What “confidence” would be associated with the following interval? Assume that the random variable Y is normally distributed and that the standard deviation, σ is known.

$$\left(\bar{y} - \frac{\sigma}{\sqrt{n}}, \bar{y} + 2\frac{\sigma}{\sqrt{n}}\right).$$

- (a) 75.85% (b) 86.85% (c) 81.85%
(d) None of the others (e) 84.85%

5. Given that $Y_1 = 2, Y_2 = 1,$ and $Y_3 = 4$ is a random sample from

$$f_Y(y; \theta) = \frac{y^3 e^{-\frac{y}{\theta}}}{6\theta^4}, y \geq 0$$

- (a) $\frac{5}{12}$ (b) $\frac{7}{12}$ (c) $\frac{9}{12}$
(d) None of the others (e) $\frac{11}{12}$

6. Let Y_1, \dots, Y_n be a random sample from

$$f_Y(y; \lambda) = \lambda e^{-\lambda y}.$$

Suppose $\hat{\lambda}$ is an unbiased estimator for λ . Find the Cramer-Rao lower bound for $Var(\hat{\lambda})$.

- (a) $\frac{\lambda}{n^2}$ (b) None of the others (c) $\frac{\lambda}{n}$
(d) $\frac{\lambda^2}{n^2}$ (e) $\frac{\lambda^2}{n}$

7. Let Y_1, \dots, Y_{25} be a random sample from a normal distribution Y where $\sigma_Y = 18$. Find \bar{y}^* so that to test $H_0 : \mu = 120$ versus $H_1 : \mu < 120$ at the 0.05 level of significance, we reject H_0 if $\bar{y} \leq \bar{y}^*$.

(a) 115.096

(b) 114.096

(c) 117.096

(d) 116.096

(e) None of the others