

**MIDTERM EXAMINATION #1 ANSWER KEY**  
**“Introduction and Statistics Review”**  
**February 14, 2008**

**VERSION A**

**I. MULTIPLE CHOICE:** [3 pts each—45 pts total]

(1)c. (2)a. (3)c. (4)c. (5)b. (6)c. (7)e. (8)c. (9)b. (10)d. (11)a. (12)a. (13)c. (14)a.

**II. PROBLEMS:**

(1) [Least-squares calculation: 15 pts]

- a. 1. b. 3. c. 5, 7, 9. d. -2, +4, -2.  
e. see graph at right.

(2) [Moments: 12 pts]

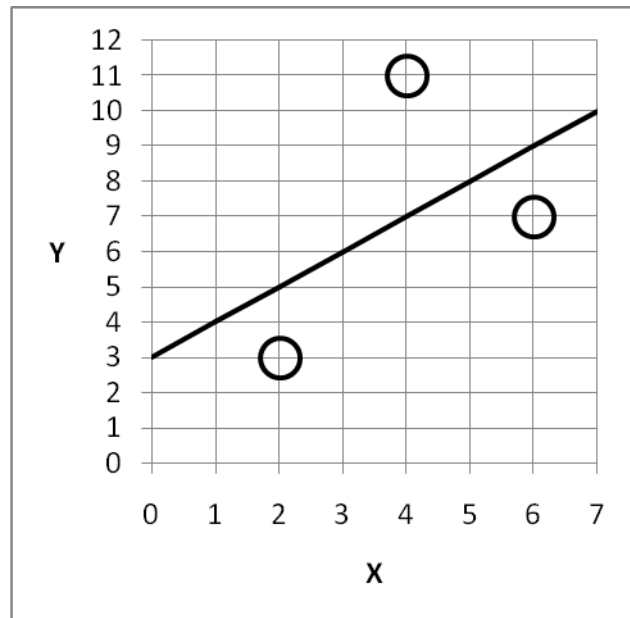
- a. 11. b. 49. c. 7. d. 0.9375.

(3) [Estimation: 12 pts]

- a.  $E(\hat{\mu})=9$ . b.  $\text{Bias}(\hat{\mu})=+3$ .  
c.  $\text{Var}(\hat{\mu})=2$ . d.  $\text{MSE}(\hat{\mu})=11$ .

(4) [Inference for arbitrary distribution, large sample: 18 pts]

- a. Discrete distribution because can only take values that are nonnegative integers.  
b. estimate=1.4 .  
c. SE=0.17,  
d.  $\text{CI} = 1.4 \pm 1.96(0.17) = 1.4 \pm 0.3332 = (1.0668, 1.7332)$ .  
e. Test statistic =  $(1.4-1)/0.17 = 2.353$ ; critical point = 1.645; conclusion = reject null hypothesis at 5%.



**VERSION B**

**I. MULTIPLE CHOICE:** [3 pts each—45 pts total]

(1)c. (2)b. (3)d. (4)c. (5)b. (6)c. (7)d. (8)b. (9)e. (10)a. (11)b. (12)b. (13)b. (14)b.

**II. PROBLEMS:**

(1) [Least-squares calculation: 12 pts]

- a. 2. b. 4. c. 4, 6, 8. d. -2, 4, -2.
- e. see graph at right.

(2) [Moments: 12 pts]

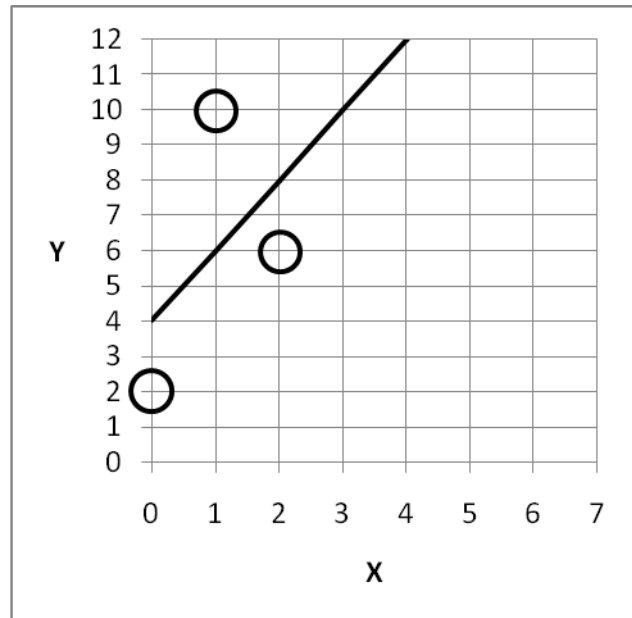
- a. 20. b. 64. c. 8. d. 0.05.

(3) [Estimation: 12 pts]

- a.  $E(\hat{\mu})=10$ . b.  $\text{Bias}(\hat{\mu})=-2$ .
- c.  $\text{Var}(\hat{\mu})=5$ . d.  $\text{MSE}(\hat{\mu})=9$ .

(4) [Inference for arbitrary distribution, large sample: 18 pts]

- a. Discrete distribution because can only take values that are nonnegative integers.
- b. estimate=2.2 .
- c. SE=0.14.
- d.  $\text{CI} = 2.2 \pm 1.96(0.14) = 2.2 \pm 0.2744 = (1.9256, 2.4744)$ .
- e. Test statistic =  $(2.2-2)/0.14 = 1.429$ ; critical point = 1.645; conclusion = cannot reject null hypothesis at 5%.



**VERSION C**

**I. MULTIPLE CHOICE:** [3 pts each—45 pts total]

(1)a. (2)c. (3)a. (4)d. (5)b. (6)c. (7)c. (8)a. (9)d. (10)b. (11)d. (12)b. (13)d. (14)b.

**II. PROBLEMS:**

(1) [Least-squares calculation: 12 pts]

- a. -1. b. 8. c. 6, 5, 4. d. 1, -2, 1.
- e. see graph at right.

(2) [Moments: 12 pts]

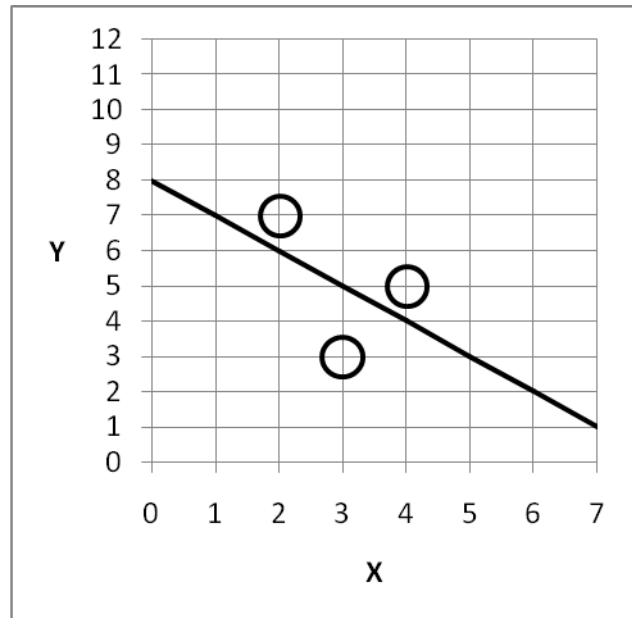
- a. 15. b. 25. c. 5. d. 0.04167.

(3) [Estimation: 12 pts]

- a.  $E(\hat{\mu})=8$ . b.  $\text{Bias}(\hat{\mu})=2$ .
- c.  $\text{Var}(\hat{\mu})=3$ . d.  $\text{MSE}(\hat{\mu})=7$ .

(4) [Inference for arbitrary distribution, large sample: 18 pts]

- a. Discrete distribution because can only take values that are nonnegative integers.
- b. estimate=1.9 .
- c. SE=0.11.
- d.  $\text{CI} = 1.9 \pm 1.96(0.11) = 2.1 \pm 0.2156 = (1.6844, 2.1156)$ .
- e. Test statistic =  $(1.9-2)/0.11 = -0.9091$ ; critical point = -1.645; conclusion = cannot reject null hypothesis at 5%.



[end of answer key]