

**Each multiple choice question is worth 5 points.**

1. The average score on a competency exam was 73 with a standard deviation of 8.3. Within what range would we expect approximately 99.7% of the scores to fall?
  - a. 64.7 – 81.3
  - b. 56.4 – 89.6
  - c. 48.1 – 97.9
  - d. 64.4 – 81.6
  - e. None of the above.
  
2. Researchers at a pharmaceutical company found that the effective time duration of a safe dosage of a pain relief drug is normally distributed with mean  $\mu = 3.4$  hours and standard deviation  $\sigma = 0.4$  hours. For a patient selected at random what is the probability that the drug will be effective for 4 hours or less?
  - a. 0.3849
  - b. 0.6291
  - c. 0.4332
  - d. 0.8849
  - e. None of the above.
  
3. Leo has a pizza business. The times to prepare and deliver pizzas are approximately normally distributed with mean  $\mu = 18$  minutes and standard deviation  $\sigma = 9$  minutes. Leo advertises “If it takes more than 30 minutes to get your pizza, you get it free.” Approximately what percentage of pizzas does Leo have to give away free?
  - a. 4%
  - b. 9%
  - c. 46%
  - d. 17%
  - e. 41%

4. A scholarship fund has enough money to award full four-year scholarships to the top 18% of its applicants. Find the  $z$  value such that approximately 18% of the area under the standard normal curve lies to the right of  $z$ .
- a. 1.02
  - b. 0.82
  - c. 0.92
  - d. 0.18
  - e. None of the above.
5. Solve for  $x$ :  $\frac{3x}{2} + \frac{x}{4} = \frac{5x}{6} - \frac{1}{3}$ .
- a.  $x = \frac{1}{3}$
  - b.  $x = \frac{1}{18}$
  - c.  $x = \frac{1}{6}$
  - d.  $x = -\frac{1}{2}$
  - e.  $x = -\frac{4}{11}$
6. Fannie knows that her brother Freddie paid \$28,728, including tax, for a new car. If the sales tax rate is 8%, then what is the cost of the car before the tax? Round your answer to the nearest dollar.
- a. \$26,600
  - b. \$26,430
  - c. \$15,960
  - d. \$22,982
  - e. \$25,364

7. Solve  $S_n = \frac{n}{2}(a_1 + a_n)$  for  $a_1$ .

a.  $a_1 = \frac{2S_n - n}{a_n}$

b.  $a_1 = \frac{2S_n}{n \cdot a_n}$

c.  $a_1 = \frac{2S_n}{n} - a_n$

d.  $a_1 = S - \frac{n}{2} - a_n$

e.  $a_1 = 2S_n - n - n \cdot a_n$

8. Solve for  $x$ :  $6x^2 - 7x + 2 = 0$ .

a.  $x = \frac{2}{3}$  or  $x = \frac{1}{2}$

b.  $x = \frac{1}{6}$  or  $x = 1$

c.  $x = \frac{4}{3}$  or  $x = 1$

d.  $x = -\frac{2}{3}$  or  $x = -\frac{1}{2}$

e.  $x = 3$  or  $x = 4$

9. A sky diver steps out of an airplane at 5000 feet. If her height above the ground at time  $t$  seconds is  $s = -16t^2 + 5000$ , find how long it takes to reach 4000 feet. Round your answer to the nearest tenth of a second.

a. 62.5 seconds

c. 56.3 seconds

b. 7.9 seconds

d. 23.7 seconds

e. 17.7 seconds

10. Solve the inequality  $-0.5x + 2.7 > 4.1x - 3.6$ . Round to 2 decimal places if necessary. Write the answer in interval notation.

- a.  $(1.37, \infty)$
- b.  $(0.25, \infty)$
- c.  $(-\infty, 1.37)$
- d.  $(4.40, \infty)$
- e.  $(-\infty, 4.40)$

11. A utility company has a fleet of vans. The annual operating cost  $C$  per van is

$$C = 0.32m + 2300$$

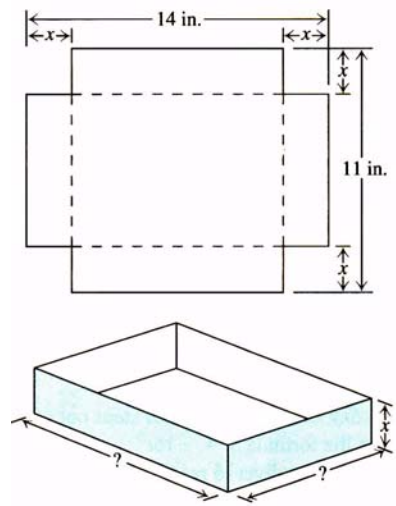
where  $m$  is the number of miles traveled by a van in a year. What number of miles will yield an annual operating cost that is less than \$10,000?

- a. Greater than 24,062.5 miles
  - b. Less than 24,062.5 miles
  - c. Greater than 38,437.5 miles
  - d. Less than 38,437.5 miles
  - e. Greater than 2464 miles
12. The rent for a two-bedroom apartment was \$800 in 1998 and \$1200 in 2001. If the rent for a two-bedroom apartment follows a linear growth pattern, what is the rate of change per year for the rent?
- a. \$1.50
  - b. \$133.33
  - c. \$400
  - d. \$200
  - e. \$100

13. Write the equation of the straight line that passes through the point  $(-4, -1)$  and is perpendicular to the line  $y = 4x - 5$ .
- a.  $y = 4x - 17$
  - b.  $y = 4x + 15$
  - c.  $y = -\frac{1}{4}x - 2$
  - d.  $y = \frac{1}{4}x - 2$
  - e.  $y = -\frac{1}{4}x$
14. A business purchases a piece of equipment for \$850. After 5 years the equipment will have no value. Write a linear equation giving the value  $V$  of the equipment during the 5 years.
- a.  $V = -170t + 850$
  - b.  $V = -850t + 170$
  - c.  $V = -170t$
  - d.  $V = 850t - 170$
  - e.  $V = 170t - 850$



16. Joelle wants to make an open-top box for packing baked goods by cutting equal squares from each corner of an 11 in. by 14 in. piece of cardboard as shown in the diagram. She wants the area of the bottom to be  $80 \text{ in.}^2$ . What size square should she cut from each corner?



17. The average number of hours per year,  $y$ , that Americans 12 years of age and older spent on the internet from 1996 to 2001 is shown in the table. Let  $t$  represent the year, with  $t = 0$  corresponding to 1990.

Year, $t$	6	7	8	9	10	11
Hours, $y$	10	34	54	82	106	134

- a. Determine the line of best fit for this data. Round to 2 decimal places.
- \_\_\_\_\_
- b. What is the value of the correlation coefficient? Round your answer to 4 decimal places.
- \_\_\_\_\_
- c. Use the model to predict the number of hours per year that Americans 12 years of age or older will spend on the internet in 2008.
- \_\_\_\_\_

Multiple Choice Key  
M114 Exam 2

1. C
2. E
3. B
4. C
5. E
6. A
7. C
8. A
9. B
10. C
11. B
12. B
13. C
14. A

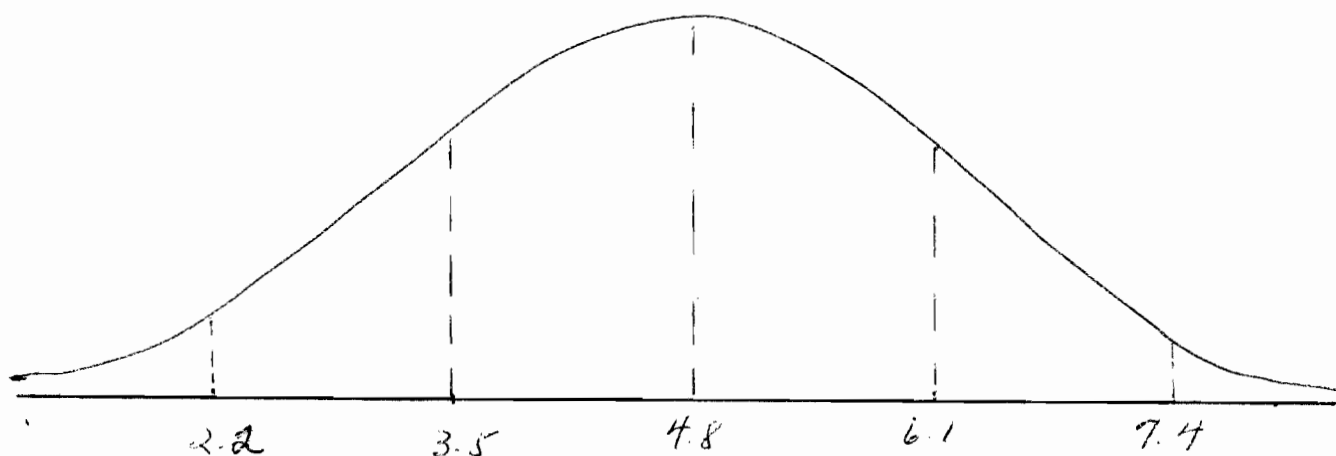
Name: \_\_\_\_\_ Section: \_\_\_\_\_

Instructor: \_\_\_\_\_

Please show all work to receive credit.

15. The length of life of a certain type of refrigerator is approximately normally distributed with a mean of 4.8 years and a standard deviation of 1.3 years. (10 points)

- a. Draw a normal curve on which this mean and standard deviation are correctly located.



- b. What is the probability that the machine you purchased will last between 3 and 5 years?

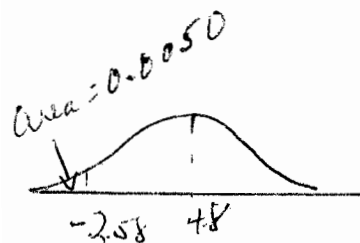


$$z = \frac{3 - 4.8}{1.3} = -1.38 \quad \text{Area} = 0.0838$$

$$z = \frac{5 - 4.8}{1.3} = 0.15 \quad \text{Area} = 0.5596$$

$$P(3 \leq x \leq 5) = P(-1.38 \leq z \leq 0.15) \\ = 0.5596 - 0.0838 = 0.4758$$

- c. What period of time should the manufacturer give as a guarantee if it is willing to replace only 0.5% of the machines? (Round your answer to 1 decimal place.)



$$-2.58 = \frac{x - 4.8}{1.3}$$

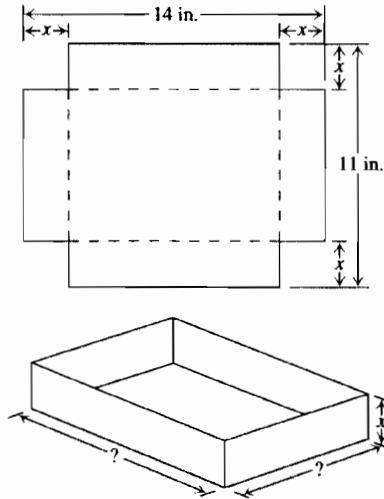
$$-3.354 = x - 4.8$$

$$1.446 = x$$

$$x = 1.4 \text{ yr}$$

$$0.5\% = 0.0050 \\ = \text{Area} \\ z = -2.58$$

16. Joelle wants to make an open-top box for packing baked goods by cutting equal squares from each corner of an 11 in. by 14 in. piece of cardboard as shown in the diagram. She wants the area of the bottom to be  $80 \text{ in.}^2$ . What size square should she cut from each corner?



$$\begin{aligned} \text{Length of box} &= 14 - 2x \\ \text{Width of box} &= 11 - 2x \end{aligned}$$

$$L \cdot W = A$$

$$(14 - 2x) \cdot (11 - 2x) = 80$$

$$154 - 50x + 4x^2 = 80$$

$$4x^2 - 50x + 74 = 0$$

$$x = \frac{-(-50) \pm \sqrt{(-50)^2 - 4(4)(74)}}{2 \cdot 4}$$

$$x = \frac{50 \pm \sqrt{2500 - 1184}}{8}$$

$$x = \frac{50 \pm \sqrt{1316}}{8}$$

$$x = \frac{50 - \sqrt{1316}}{8}$$

$$x = 1.715410\dots$$

$$x \approx 1.7 \text{ in}$$

$$\text{or } x = \frac{50 + \sqrt{1316}}{8}$$

$$x = 10.78458929\dots$$

$$x \approx 10.8$$

The square should be  
1.7 in on each side.

↑ too large

17. The average number of hours per year,  $y$ , that Americans 12 years of age and older spent on the internet from 1996 to 2001 is shown in the table. Let  $t$  represent the year, with  $t = 0$  corresponding to 1990.

Year, $t$	6	7	8	9	10	11
Hours, $y$	10	34	54	82	106	134

- a. Determine the line of best fit for this data. Round to 2 decimal places.

$$y = 24.69t - 139.83$$

- b. What is the value of the correlation coefficient? Round your answer to 4 decimal places.

$$r = 0.9989$$

- c. Use the model to predict the number of hours per year that Americans 12 years of age or older will spend on the internet in 2008.

In 2008,  $t$  is 18.

$$y = 24.69(18) - 139.83$$

$$y = 304.59$$

$$y \approx 305 \text{ hr}$$

$$\underline{305 \text{ hr}}$$