

Stats for Business Practice Quiz 5

DO NOT TURN QUIZ OVER !!
(until asked to do so)

For maximum benefit, observe exam conditions:

- Write answers yourself (No help from classmates)
- Calculators may not be shared.
- Use pencil/pen and calculator only. (No notes/cell phones.)
- **You MAY use Notebook table p. 6–7 (ONLY those pages)**
- You have **12** minutes for quiz. **(We review afterward)**

Potentially Useful Formula:

$$Z = \frac{x - \mu}{\sigma}$$

DIRECTIONS: Turn **face down** when finished. You have **12** minutes to complete the quiz.

Business *profit* is defined as

$$\text{Profit} = \text{Revenue} - \text{Expenses}$$



where

- Revenue = money paid to the business (by customers) in exchange for goods and services
- Expenses = cost of producing those goods and services

Every business tries to make a (positive) profit. Unfortunately, businesses sometime *lose* money when expenses exceed revenue, in which case “profit” becomes a negative number! Suppose that annual profit for Mike’s Shoe Shop in downtown Iowa City is approximately normally distributed with mean \$90,000 and standard deviation \$40,000.

- (a) What is the *minimum* annual profit for Mike’s shop over almost all years? Answer: _____
(Tips: We could answer this question before Exam 1! A *negative* profit is a loss.)
- (b) In what percentage of years does the shop experience a profit between \$125,000 and \$150,000?
(**Show work below. Round percent to two decimal places.**) Answer: _____
- (c) What is the minimum annual profit for the 25% most profitable years?
(**Show work below. Round answer to nearest dollar.**) Answer: _____

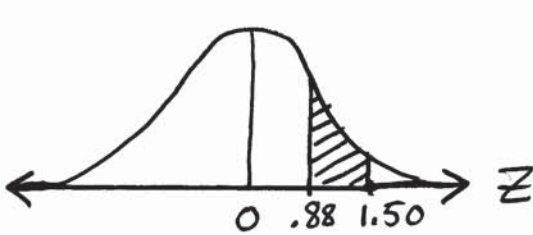
Macbride Quiz Announcements

- I post **Practice Quiz Solution** on the **Stats Website** after each quiz for easy review. (See [Macbride Quiz page](#).)
- **Self-Grading!** Now compare your answers to the solution that I show!
- Spend the last few minutes of class self-grading and comparing answers. **Speak with TAs!**

SOLUTION

- (a) Three standard deviations below the mean is $90,000 - (3)(40,000) = 90,000 - 120,000 = \boxed{-\$30,000}$
 (This means that the shop loses \$30,000 during the year.)

- (b) $x =$ annual profit, in \$ $\mu = 90,000$ $\sigma = 40,000$ Find $P(125,000 < x < 150,000)$



$$Z = \frac{x - \mu}{\sigma}$$

$$Z_1 = \frac{x - \mu}{\sigma} = \frac{125,000 - 90,000}{40,000} = 0.88$$

$$Z_2 = \frac{x - \mu}{\sigma} = \frac{150,000 - 90,000}{40,000} = 1.50$$

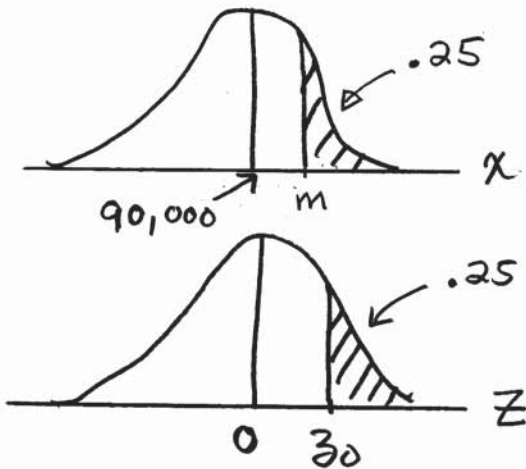
$$P(125,000 < x < 150,000) = P(0.88 < Z < 1.50)$$

$$= \text{Table}(1.50) - \text{Table}(0.88)$$

$$= .9332 - .8106 = .1226 = \boxed{12.26\%}$$

- (c) Let $m =$ minimum annual profit for best 25% years

$$P(x > m) = .25 \implies P(Z > z_0) = .25 \implies z_0 = 0.67$$



$$Z = \frac{x - \mu}{\sigma}$$

$$z_0 = \frac{m - \mu}{\sigma}$$

$$0.67 = \frac{m - 90,000}{40,000}$$

$$m = 90,000 + (0.67)(40,000)$$

$$= 90,000 + 26,800$$

$$= \boxed{\$116,800}$$