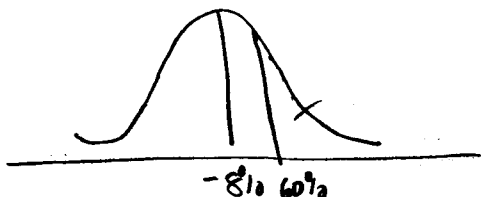


1. The next 3 questions refer to this statement, but each question is separate (i.e. you can get the first one wrong and it won't affect the others): Los Angeles has been suffering economically as a result of this year's stock market decline and loss of tax revenue. The 20,000 restaurants and eateries in Los Angeles reflect this economic downturn in their percentage change in sales. Suppose the sales for all of these restaurants are normally distributed with an average percentage change in sales of -8% over the last year (they loss 8% of their sales on average) and a standard deviation of 6%. SHOW YOUR WORK FOR FULL CREDIT.

A. The percentage change in sales for your favorite restaurant was at the 60th percentile. What exactly was the value of its percentage change? (5 points)



$$40 + 40 = 80\%$$

$$100 - 80\% = 20\% \text{ area}$$

$$z = +0.25$$

$$z = \frac{x - \bar{x}}{s}$$

$$0.25 = \frac{x - (-8)}{6}$$

$$x = -6.5\%$$

B. What percentage of restaurants experienced a decrease in sales over the last year? (5 points)



$$\frac{0 - (-8)}{6} = 1.33$$

$$= 82.30\%$$

$$\frac{100 - 82.30}{2} = 8.85\%$$

$$82.30\% + 8.85\% = 91.15\%$$

1.30
1.31
1.32
1.33
1.34
1.35

C. Using only the information given at the beginning (i.e. ignore any additional information from parts A and B), is it possible to calculate the inter-quartile range for this distribution of percentage change in sales? If yes, please calculate the IQR for this variable. If no, please write "not calculable" in the space below and explain verbally why it is not calculable. (7 points)

Yes.



For area of 50%, $z = \pm 0.65$

$$Q_3 = +0.65 \frac{x - (-8)}{6}$$

$$x = -4.1\%$$

$$Q_1 = -0.65 \frac{x - (-8)}{6}$$

$$Q_1 = -11.9\%$$

$$Q_3 - Q_1 =$$

$$-4.1 - (-11.9) = 7.8\%$$

The Dull Computer Company manufactures its own computers and delivers them directly to customers who order them via the Internet. Dull's market dominance has arisen from its quick delivery and competitive pricing. The CEO (Chief Executive Officer) of Dull has stated publicly that if customers make unassisted online purchases of their computers, the computers will have a mean delivery time of 45 hours from the time of purchase (with a standard deviation of 11 hours) and have a mean cost of \$1,588 with a standard deviation of \$401. Please assume that the delivery time and the cost of all the computers is normally distributed

A consumer research organization decided to test the CEO's mean delivery time claim by purchasing 100 computers from Dull at randomly selected times and days. The 100 purchases were randomly divided into two groups: 49 were purchased by telephone and involved talking to a live salesperson, the remaining 51 were unassisted online purchases. The delivery time of the 51 had a mean of 52 hours with a standard deviation of 16 hours and they also had a mean cost of \$1,503 with a standard deviation of \$678. 11 of the 51 computers cost less than \$1457.

2A. (2 points) The sample of interest to the consumer research organization is

- (a) 100 computers purchased from Dull by the consumer research organization —
- (b) 49 computers purchased by telephone
- (c) 51 computers purchased online and unassisted
- (d) all Dull Computers
- (e) all Dull Computers purchased online and unassisted

45 hours
52 hours

2B. (2 points) The statistic of greatest interest to the consumer research organization is

- (a) \$1,503
- (b) \$1,588
- (c) \$678
- (d) \$401
- (e) 52 hours —
- (f) 16 hours
- (g) 45 hours
- (h) 11 hours

2C. (2 points) The population of interest to the consumer research organization is

- (a) 100 computers purchased from Dull by the consumer research organization
- (b) 49 computers purchased by telephone
- (c) 51 computers purchased online and unassisted
- (d) all Dull Computers —
- (e) all Dull Computers purchased online and unassisted —

2D. (2 points) The parameter of greatest interest to the consumer research organization is

- (a) \$1,503
- (b) \$1,588
- (c) \$678
- (d) \$401
- (e) 52 hours
- (f) 16 hours
- (g) 45 hours —
- (h) 11 hours

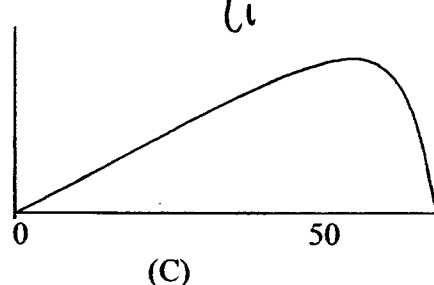
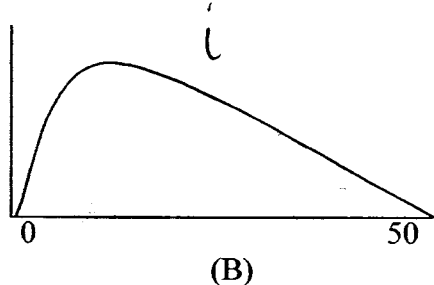
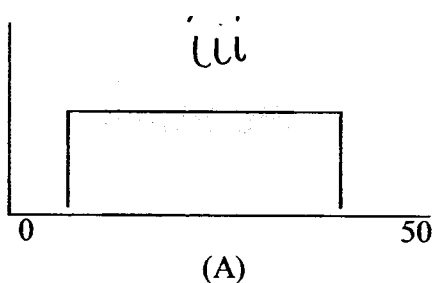
2E. (2 points) The median delivery time of all Dull computers purchased online and unassisted is

- (a) Greater than 45 hours and also greater than 52 hours
- (b) Less than 45 hours and also less than 52 hours
- (c) Greater than 45 hours but less than 52 hours
- (d) 45 hours
- (e) 52 hours
- (f) Not possible to calculate the median from the information provided

3. Please indicate whether each statement is true or false (one point each)

	True	False	Statement
A	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If a large number of those selected for a sample do not in fact respond, problems of response bias are likely
B	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Probability methods are used in sampling because they are impartial <u>but</u> they cannot minimize bias
C	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Confounding is a major source of <u>bias</u>
D	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Double blind experiments no better at preventing confounding than blind experiments
E	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A histogram is a graphical summary which represents percentages as areas
F	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The total area of a histogram is always 100% when areas are expressed as percentages
G	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Larger samples are better than smaller samples at preventing bias
H	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Incorporating a density scale in a histogram means that the height of each block divided by the width of the class interval equals the <u>percentage of cases in that class interval</u>
I	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The area under the histogram between two values is equal to the <u>percentage of cases in a class interval defined by those values</u>
J	<input type="checkbox"/>	<input checked="" type="checkbox"/>	In a randomized controlled experiment utilizing a placebo, if the control group is comparable to the treatment group, then the difference in the responses of the two groups is likely to be a result of the placebo effect

4. Here are three histograms, assume they have been correctly drawn:



Match each histogram above to the best choice listed below: (2 points each, 6 points total)

- i. The average is larger than the median
- ii. The average is smaller than the median.
- iii. The average is equal to the median
- iv. Cannot determine the average for this graphic
- v. Cannot determine the median for this graphic

5. In observational studies (choose one) (2 points)

- a. Investigators assign subjects to treatment or control ☐
- b. There cannot be control groups ☐
- c. Investigators can establish association ☒
- d. Confounding factors cannot be controlled ☐
- e. All of the above are false ☐
- f. Only B and C are true ☐
- g. Only D is false ☐