**OSA Training 2015**

**Statistics Part 1&2** **Practice Questions**

## The Basics of Statistics

1. A doctor wants to test the effectiveness of a new drug on her patients. She separates her sample of patients into two groups and administers the drug to only one of these groups. She then compares the results. Which type of study *best* describes this situation? **(4)**

1) census

2) survey

3) observation

4) controlled experiment

2. Decide on a method of data collection you would use for each study. Explain

(a) A study on the effect of low dietary intake of vitamin C and iron on lead levels in adults.

**Controlled Experiment**

(b) The age of people living within 500 miles of your home.

**Survey**

## Frequency Distributions and Statistical Graphs

3. The following set of data is a sample of scores on a civil service exam:

58, 79, 81, 99, 68, 92, 76, 84, 53, 57,

81, 91, 77, 50, 65, 57, 51, 72, 84, 89

(a) Complete the frequency distribution below for the data.

| Classes/Intervals | Frequencies | Cumulative Frequencies |
|---|---|---|
| 50 – 59 | **6** | **6** |
| 60 – 69 | **2** | **8** |
| 70 – 79 | **4** | **12** |
| 80 – 89 | **5** | **17** |
| 90 –99 | **3** | **20** |

(b) Construct a frequency histogram for the data set.

(c) Construct a cumulative frequency histogram for the data set

(d) Compare and contrast the two histograms in pats (b) and (c).

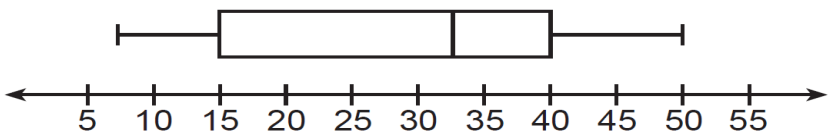
The bars in the regular frequency histogram fluctuates (go up and down), The bars in the cumulative frequency histogram however, consistently rise.

(e) Construct a stem-and-leaf plot for the data set.

| Stem | Leaf |
|---|---|
| 5 | 0 1 3 7 7 8 |
| 6 | 5 8 |
| 7 | 2 6 7 9 |
| 8 | 1 1 4 4 9 |
| 9 | 1 2 9 |

4. The box-and-whisker plot below represents the ages of 12 people. What percentage of these people is age 15 or older?

**75%**



## Inter-Quartile Range

5. The test scores for 15 employees enrolled in a CPR training course are listed.

**13 9 18 15 14 21 7 10 11 20 5 18 37 16 17**

(a) Find the first, second, and third quartiles of the test scores.

**$Q_1 = 10$ $Q_2 = 15$ $Q_3 = 18$**

(b) Create a box-and-whisker plot for the scores

(c) Find the *IQR* for the scores

***IQR = 8***

## Standard Deviation and The Normal Distribution

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Corp A Salary** | **41** | **38** | **39** | **45** | **47** | **41** | **44** | **41** | **37** | **42** |
| **Corp B Salary** | **40** | **23** | **41** | **50** | **49** | **32** | **41** | **29** | **52** | **58** |

6.(a) Two corporations hired 10 graduates. The starting salaries for each are shown in thousands of dollars. Find the deviation for the starting salaries of each corporation.

Corp A = 2.974

Corp B = 10.5

(b) Find the inter quartile range *(IQR),* for the starting salaries of the two corporations above.

**Corp A *IQR* = 5**

**Corp B *IQR* = 18**

(c) Based on your answer to parts (a) & (b), which corporation seems fairer with regard to starting salaries? Explain

**Corp A because the starting salaries are more clustered than those of Corp B.**

7. A study shows that 80% of the selling prices f houses in an area are within two standard deviations of the mean. Is this a normal distribution? Explain.

**No. If the data set was normally distributed, then about 95% of the data would be within two standard deviations of the mean.**

8. The mean price of houses in Canarsie BK is $482,156, with a standard deviation of $30,000. The data set has a bell shaped distribution. Between what two prices do 95% of the houses fall?

**Between $422,156 & $542,156**

9. On a standardized test, Cathy had a score of 74, which was exactly 1 standard deviation below the mean. If the standard deviation for the test is 6, what is the mean score for the test? **(4)**

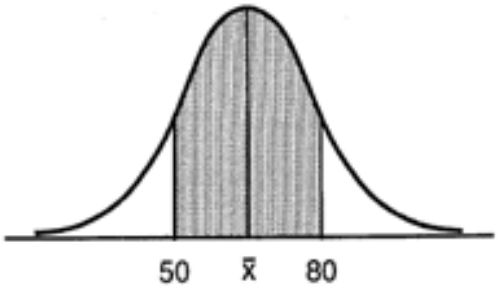
1) 68

2) 71

3) 77

4) 80

10. In the accompanying diagram, about 68% of the scores fall within the shaded area, which is symmetric about the mean, $\bar{x}$. The distribution is normal and the scores in the shaded area range from 50 to 80.




What is the standard deviation of the scores in this distribution?

**15**

11. In a normal distribution, $\bar{x}+2\sigma=80$ and $\bar{x}-2\sigma=40$ when $\bar{x}$ represents the mean and $\sigma$ represents the standard deviation. What is the standard deviation?

**10**

12. On a standardized test with normal distribution, the mean is 75 and the standard deviation is 6. If 1200 students took the test, approximately how many students would be expected to score between 69 and 81? **(3)**

1) 408

2) 600

3) 816

4) 1140

**Comparing z-scores**

13. Lester, a statistician, measured the mean speed of vehicles on the Belt highway at 7:30am and got 56mph with a standard deviation of 4mph.

Amanda, a highway patrol, clocks three cars with speeds of 62mph, 42mph and 56mph at the same time.

(a) Find the z-scores for each speed

**62mph = 1.5** **42mph = -3.5** **56mph = 0**

(b) Which speed should be issued a ticket? Explain

**42mph, because that speed poses a greater threat to the flow of traffic.**

14. On Kyana's statistics test, the mean score was 79 with a standard dev of 7. On her ELA test the mean was 43 with a standard dev 3. Determine which test Kyana performed better on comparatively with respect to her peers:

STATS: 90 ELA: 50

**z = 1.57** **z = 2.33**

**94%** **99%**

**Kyana did better on the ELA test because her percentile rank is higher**

15. Jim's score on a national math assessment exceeded the scores of 95,000 of the 125,000 students who took the assessment. What was Jim's percentile rank?

**76%**

16. In a New York City high school, a survey revealed the mean amount of cola consumed each week was 12 bottles and the standard deviation was 2.8 bottles. Assuming the survey represents a normal distribution, how many bottles of cola per week will approximately 68.2% of the students drink? **(3)**

1) 6.4 to 12

2) 6.4 to 17.6

3) 9.2 to 14.8

4) 12 to 20.4

## Measures of Central Tendency

17. The number of minutes students took to complete a quiz is summarized in the table below.

| Minutes | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|
| Number of Students | 5 | 3 | x | 5 | 2 | 10 | 1 |

If the mean number of minutes was 17, which equation could be used to calculate the value of $x$? **(4)**

1) $17 = \frac{119 + x}{x}$

2) $17 = \frac{119 + 16x}{x}$

3) $17 = \frac{446 + x}{26 + x}$

4) $17 = \frac{446 + 16x}{26 + x}$

18. The air conditioner priced at $480 is discontinued at a local department store. What is the median price of the remaining air conditioners? **(455)**

$500 $840 $470 $480 $420 $440 $440