

Answer Key

Testname: EXAM 1_P1_SP_11

- 1) C
- 2) A
- 3) A
- 4) B
- 5) C
- 6) A
- 7) B
- 8) A
- 9) D
- 10) E
- 11) A
- 12) E
- 13) B
- 14) B
- 15) C
- 16) A
- 17) B
- 18) C
- 19) D
- 20) D
- 21) A
- 22) B
- 23) D
- 24) B
- 25) C
- 26) D
- 27) B
- 28) C
- 29) D
- 30) D
- 31) A
- 32) B

MATH 103 EXAM ONE
PART II/FREE ANSWER/56 POINTS POSSIBLE
SHOW ALL WORK FOR FULL CREDIT!!!

Use the following information to answer question 1. DO NOT USE THE STAT FEATURE ON YOUR CALCULATOR FOR THIS PROBLEM. Include the appropriate units in your results.:

1. (20 points) The National Highway Traffic Safety Administration conducted crash tests of child booster seats for cars. Listed below are results from those tests, with the measurements given in hic (standard *head injury condition* units). According to the safety requirement, the hic measurement should be less than 1000.

774 649 1210 546 431 612
 431 546 612 649 774 1210

- a. (2 points) Find the mean.

$$\bar{x} = \frac{774 + 649 + 1210 + 546 + 431 + 612}{6}$$

$$\bar{x} \approx 703.7 \text{ hic}$$

- b. (2 points) Find the median.

$$\tilde{x} = \frac{612 + 649}{2} = 630.5 \text{ hic}$$

- c. (2 points) Find the mode.

no mode

- d. (2 points) Find the midrange.

$$\text{midrange} = \frac{431 + 1210}{2} = 820.5 \text{ hic}$$

- e. (2 points) Find the range.

$$\text{range} = 1210 - 431 = 779 \text{ hic}$$

- f. (5 points) Find the variance.

$$\begin{aligned} (774 - 703.7)^2 &= 4942.09 \\ (649 - 703.7)^2 &= 2992.09 \\ (1210 - 703.7)^2 &= 256339.69 \\ (546 - 703.7)^2 &= 24869.29 \\ (431 - 703.7)^2 &= 74365.29 \\ (612 - 703.7)^2 &= 8408.89 \end{aligned}$$

$$s^2 = \frac{\sum (x - \bar{x})^2}{n - 1} = \frac{371917.34}{5} \approx 74383.5$$

- g. (2 points) Find the standard deviation.

$$s = \sqrt{s^2} \approx 272.7 \text{ hic}$$

- h. (2 points) Do the different child booster seats have much variation among their crash test measurements? Explain.

yes, there seems to be much variation due to the maximum value.

2. (2 points) An article from the Feb 2, 2003 Atlanta Journal Constitution about the bleak job market for MBA students graduating in 2003 described an opinion survey conducted by a graduate student at a major state university. The student polled 1500 executive recruiters, asking their opinions on the industries most likely to hire. He received back questionnaires from 97 recruiters, of whom 54 indicated that health care was the industry most likely to see job growth. Name two potential sources of bias with this survey.

voluntary response
non-response

3. (3 points) The general manager of a luxury hotel decides to check the quality of housekeeping by inspecting 15 rooms. Consider that the hotel offers economy and business-class rooms as well as suites. Select the best method of sampling 15 rooms from the choices below:

- A) Take a simple random sample of 15 rooms from all rooms at the hotel.
 B) Randomly select one floor from the hotel and check the first 15 rooms.
 C) Stratify according to type of room and randomly select 5 rooms from each to inspect.
 D) There are 15 suites, so select those and inspect each.

Use the following information to answer question 4 (11 points):

4. The 2223 people aboard the *Titanic* include 361 male survivors, 1395 males who died, 345 female survivors, and 122 females who died.

- a. (5 points) Construct the relative frequency distribution.

$$\frac{361}{2223} = 16\%$$

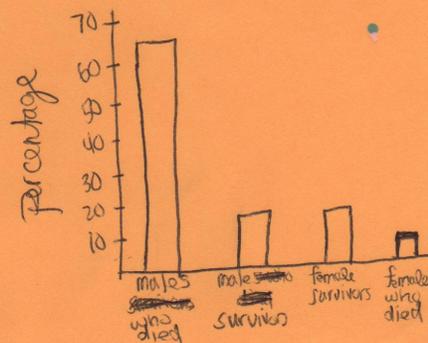
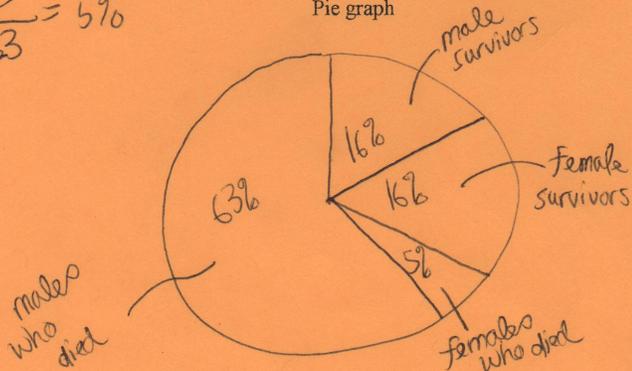
$$\frac{1395}{2223} = 63\%$$

$$\frac{345}{2223} = 16\%$$

$$\frac{122}{2223} = 5\%$$

People aboard the Titanic	Percentage
male survivors	16
males who died	63
female survivors	16
females who died	5

- b. Use the relative frequency distribution from part (a) to make a
 i. (3 points) Pie graph
 ii. (3 points) Pareto graph



Use the following information to answer question 5 (16 points):

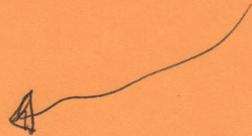
5. A simple random sample of FICO credit rating scores was obtained, and the scores are listed below.

698	751	779	664	802	836
753	693	714	818	789	834

66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83

4
38
4
13
9
9
2
8
46

a. (3 points) Make a stem and leaf plot



b. (4 points) Calculate (and label) the five-number summary

$$Q_1 = \frac{698 + 714}{2} = 706 \quad Q_2 = \frac{753 + 779}{2} = 766 \quad Q_3 = \frac{802 + 818}{2} = 810$$

min $\frac{664}{2}$, Q_1 , median, Q_3 , $\frac{836}{2}$ max

c. Construct, and clearly label, a modified boxplot for FICO credit scores

i. (4 points) Check for outliers, show all work:

$$IQR = 810 - 706 = 104$$

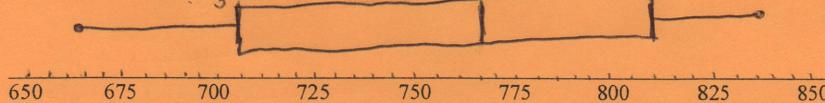
Outlier check:

ii. (5 points) Modified Boxplot:

$$Q_1 - 1.5(104) = 550$$

$$Q_3 + 1.5(104) = 966$$

no outliers



6. (4 points) Scores on the SAT test have a mean of 1518 and a standard deviation of 325. Scores on the ACT test have a mean of 21.1 and a standard deviation of 4.8. Which is relatively better: a score of 1190 on the SAT test or a score of 16.0 on the ACT test? EXPLAIN.

$$z_{SAT} = \frac{1190 - 1518}{325} \approx -1.01$$

$$z_{ACT} = \frac{16.0 - 21.1}{4.8} \approx -1.06$$

A score of 1190 on the SAT would be relatively better than a score of 16.0 on the ACT since it is less standard deviations to the left of the mean, comparatively