

**Math 206 - Test 2a**

October 20, 2010

Name key

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations where necessary.

- (2 points) All the students in a school were weighed. Their average (mean) weight was 31.4 kg, and their total weight was 18,337.6 kg. How many students are in the school?

$$\frac{18337.6}{N} = 31.4$$

584 STUDENTS

$$\Rightarrow 18337.6 = 31.4N$$

$$N = \frac{18337.6}{31.4} = 584$$

- (2 points) Chester scored 54 on a test with mean 45.39 and standard deviation 4.1. Alice scored 25 on a test with mean 19.34 and standard deviation 2.75. Compute the z-scores and determine who scored better.

CHESTER :  $\frac{54 - 45.39}{4.1} = 2.1$

CHESTER SCORED BETTER --- HIS

ALICE :  $\frac{25 - 19.34}{2.75} = 2.058... \approx 2.06$

SCORE WAS 2.10 ABOVE THE MEAN, WHILE

ALICE'S SCORE WAS 2.060 ABOVE THE MEAN.

- (2 points) The twenty children in Sam's class received the following scores on their math quizzes:

10 7 7 3 9 7 8 7 10 9  
 5 7 3 10 9 7 5 8 6 7

On the sheet of graph paper (attached), sketch the dot plot for the class data.

SEE ATTACHED GRAPH PAPER.

4. (5 points) A collection of scores is shown below. Compute the median, quartiles, IQR, and outlier cutoff scores. Then construct the corresponding box plot. (Use the attached graph paper for the box plot.)

~~4.3~~ ~~5.4~~ ~~4.9~~ 5.6 ~~4.9~~ 5.6 5.1 5.7 ~~5.2~~ 5.8  
~~5.2~~ 5.8 5.3 5.9 5.3 6.1 5.3 6.2 5.4 6.9

4.3, 4.9, 4.9, 5.1, 5.2, 5.2, 5.3, 5.3, 5.3, 5.4, 5.4, 5.6, 5.6, 5.7, 5.8, 5.8, 5.9, 6.1, 6.2, 6.9  
 $Q_1 = 5.2$                        $Med = 5.4$                        $Q_3 = 5.8$

$$IQR = 5.8 - 5.2 = 0.6$$

$$1.5 \times IQR = 0.9$$

Outliers: Lower limit  $5.2 - 0.9 = 4.3$

Upper limit  $5.8 + 0.9 = 6.7$

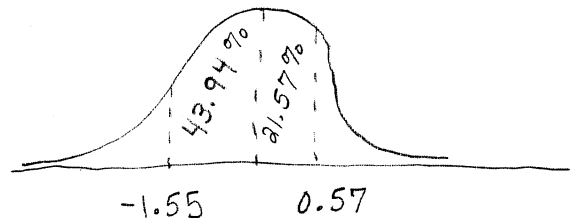
4.3 IS RIGHT ON THE BORDER --- WE WON'T COUNT IT. 6.9 IS AN OUTLIER.

SEE ATTACHED  
 GRAPH FOR  
 BOX PLOT.

5. (3 points) Biologists studying Australia's Long-Nosed Bandicoot have found that adult males have a mean weight of 6.73 lbs with a standard deviation of 0.47 lbs. Assuming bandicoot weights are normally distributed, about what percent of adult male bandicoots have weights between 6 lbs and 7 lbs?

$$Z \text{ SCORE FOR } 6 = \frac{6 - 6.73}{0.47} \approx -1.55$$

$$Z \text{ SCORE FOR } 7 = \frac{7 - 6.73}{0.47} \approx 0.57$$



Look up 1.55  $\rightarrow$  43.94%

$\Rightarrow$  BETWEEN 6 & 7 lbs

Look up 0.57  $\rightarrow$  21.57%

$\rightarrow$  65.51%

6. (1 point) In a game of chance, when payoffs are involved, what does it mean for a game to be fair?

A game IS FAIR WHEN THE COST TO PLAY  
 IS EQUAL TO THE EXPECTED VALUE.

7. (2 points) The following table shows the probabilities assigned by Arthur to the number of hours spent on homework on a given night.

Hours	Probability
1	0.15
2	0.20
3	0.40
4	0.10
5	0.05
6	0.10

How many hours should Arthur expect to spend on homework on any given night?

$$1(0.15) + 2(0.20) + 3(0.40) + 4(0.10) + 5(0.05) + 6(0.10)$$

$$= 0.15 + 0.40 + 1.20 + 0.40 + 0.25 + 0.60$$

$$= \boxed{3 \text{ HRS}}$$

IT IS A COINCIDENCE THAT THIS IS ALSO THE MOST LIKELY TIME.

8. (4 points) Consider the following collection of test scores.

~~97 51 97 46~~  
~~39 45 97 80~~

- (a) Find the mean, median, and mode. Which is not an appropriate measure of central tendency and why?

39 45 46 51 80 97 97 97

$$\text{MEAN} = \frac{552}{8} = 69$$

$$\text{MODE} = 97$$

$$\text{MEDIAN} = \frac{51+80}{2} = 65.5$$

THE MODE IS NOT AN APPROPRIATE MEASURE OF CENTER BECAUSE IT CLEARLY DOES NOT REPRESENT THE CENTER OF THE DATA.

- (b) Find the range and standard deviation. You may use your calculator to compute the standard deviation.

$$\text{RANGE} = 97 - 39 = 58$$

$$\text{STO DEV} = \sigma = 24.5$$

(FROM CALCULATOR)

9. (4 points) For each of the following situations, tell which type of graph would best display the data. Choose from *line plot*, *bar graph*, *histogram*, *line graph*, *stem-and-leaf plot*, or *circle graph*. Give a brief explanation to support your answer.

(a) Robert has been keeping track of gas prices. He would like to make a graph showing how the prices have changed over the last three weeks.

A LINE GRAPH IS BEST  
FOR SHOWING TRENDS OVER TIME.

(b) A candidate's campaign fund has come from donations in six different categories. The candidate would like to make a graph showing how the entire fund is divided up among the six categories.

A CIRCLE GRAPH IS GOOD HERE IN ORDER  
TO SHOW PORTIONS OF THE WHOLE.

(c) The National Center for Health Statistics keeps detailed records on the births and deaths of US residents. What type of graph would best display the ages at death of US residents in 2007?

HISTOGRAM - AGES ARE CONTINUOUS DATA. THEY WOULD BE GROUPED INTO INTERVALS AND COUNTED.

(d) Sarah is writing a report about Canada. In her report she would like to include a graph that shows the values of the five top exported products in 2009.

BAR GRAPH - THE DATA IS DISCRETE. THERE WOULD BE A BAR FOR EACH PRODUCT. THE HEIGHT OF EACH BAR WOULD REPRESENT VALUE.

10. (3 points) The class mean on a reading test was 27.5 out of 40 possible points. The 19 girls in the class scored a total of 532 points. What was the mean score among the 11 boys?

$$\begin{array}{l}
 \text{GIRLS' PTS} \qquad \qquad \text{BOYS' PTS} \\
 \underbrace{532} + \underbrace{11 (\text{Boys' Average})} \\
 \hline
 \underbrace{(19 + 11)} \\
 \text{TOTAL} \quad 4 \\
 \text{STUDENTS}
 \end{array}
 = 27.5$$

⇒ Boys' Average ≈ 26.64

11. (5 points) Fill in the blank with an appropriate word or phrase.

(a) The standard deviation is a measure of SPREAD OR VARIATION

(b) Points that line on the same line are said to be COLLINEAR

(c) The arithmetic mean is a measure of CENTRAL TENDANCY

(d) IQR is an abbreviation for INTER-QUARTILE RANGE

(e) A finite subset of a line that lies between two points is called a SEGMENT

12. (3 points) A jar contains 18 quarters, 13 dimes, 5 nickels, and 6 pennies. A coin is selected at random. What is the expected value?

24 COINS IN ALL

$$0.25 \left( \frac{18}{42} \right) + 0.10 \left( \frac{13}{42} \right) + 0.05 \left( \frac{5}{42} \right) + 0.01 \left( \frac{6}{42} \right)$$

$$= \frac{4.5 + 1.3 + 0.25 + 0.06}{42} = \frac{6.11}{42} \approx 0.145 = 14.5 \text{¢}$$

13. (2 points) In a certain lake, 200 fish are caught, tagged, and released. Later, 300 fish are caught, 50 of which had already been tagged. Estimate the fish population in the lake.

LET  $P$  BE THE LAKE'S FISH POPULATION

$$\frac{200}{P} = \frac{50}{300} \Rightarrow 50P = 60000$$

$$P = 1200 \text{ FISH}$$

14. (4 points) Design a simulation that could be used to estimate the solution of the following problem.

The probability of encountering a Brown Barbaloot on a walk through Sherwood forest is 0.35. On average how many Brown Barbaloots will you see on 5 walks?

Perform ten trials of your simulation. Then use your data to estimate the solution.

I WILL SELECT 5 TWO-DIGIT NUMBERS FROM THE RANDOM DIGIT TABLE TO REPRESENT 5 WALKS --- A TWO-DIGIT NUMBER FOR EACH WALK.

IF A TWO-DIGIT NUMBER IS 00-34, THAT INDICATES THAT I'VE SEEN A BARBALOOT. 35-99  $\Rightarrow$  NO BARBALOOT. THE PROB OF SEEING

A BARBALOOT IS THEN 35%.

I STARTED AT ROW 26, COLUMN 5 OF OUR RANDOM DIGIT TABLE. SEE THE ATTACHED SHEET.

AFTER 10 TRIALS ...

$$\frac{3+1+2+2+1+4+3+0+1+1}{10} = \frac{18}{10} = 1.8$$

1.8 BARBALOOTS  
PER 5  
WALKS

15. (2 points) Give an example of a data set containing 10 two-digit numbers (not all of which are the same) in which the mean, median, and mode are all equal. Then sketch the stem-and-leaf plot for the data.

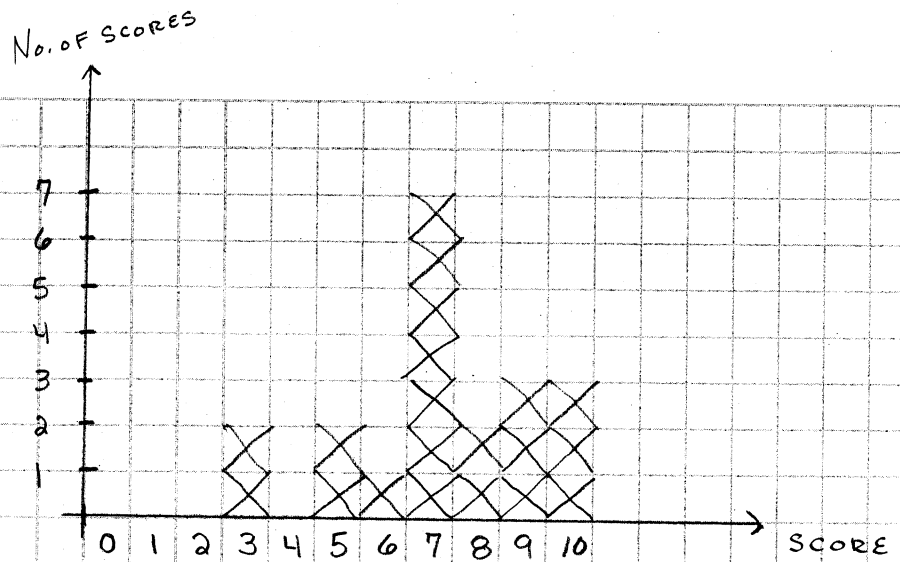
50, 50, 50, 50, 45, 55, 40, 60, 40, 60

$$\text{MEAN} = \text{MEDIAN} = \text{MODE} = 50$$

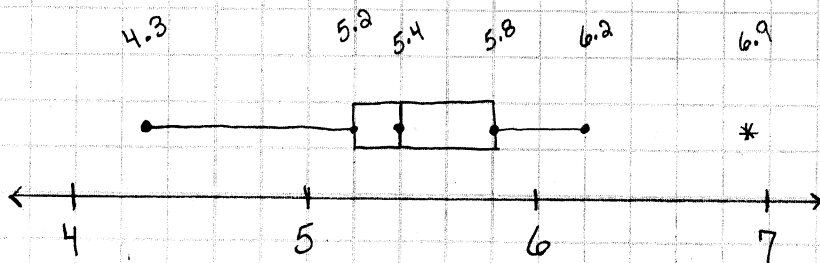
STEM-AND-LEAF  
PLOT

4	005
5	00005
6	00

Dot plot for #3



Box plot for #4



**Problem #14 Simulation**

<u>Trial</u>	<u>Walk 1</u>	<u>Walk 2</u>	<u>Walk 3</u>	<u>Walk 4</u>	<u>Walk 5</u>	<u>Number of Barbaloots</u>
1	70	<b>28</b>	<b>02</b>	42	<b>18</b>	3
2	<b>14</b>	59	60	47	44	1
3	89	<b>33</b>	63	56	<b>30</b>	2
4	97	76	<b>14</b>	<b>34</b>	44	2
5	95	89	52	41	<b>02</b>	1
6	<b>07</b>	<b>00</b>	67	<b>19</b>	<b>23</b>	4
7	<b>04</b>	80	<b>03</b>	<b>20</b>	62	3
8	41	42	56	68	62	0
9	49	<b>27</b>	54	42	70	1
10	52	51	<b>20</b>	39	51	1



# Math 206 - Test 2b

October 20, 2010

Name \_\_\_\_\_

Score \_\_\_\_\_

Show all work. Supply explanations when necessary. This problem is worth six (6) points. You must work individually on this problem.

The data below are birth weights of infants born at local hospitals.

<del>6.3</del>	<del>9.0</del>	<del>6.3</del>	<del>6.8</del>	<del>9.6</del>	<del>8.7</del>	<del>8.0</del>	<del>6.7</del>	<del>6.9</del>	<del>6.8</del>
<del>7.1</del>	<del>7.4</del>	<del>6.8</del>	<del>8.1</del>	<del>6.9</del>	<del>8.7</del>	<del>8.3</del>	<del>6.8</del>	<del>7.5</del>	<del>8.0</del>
<del>7.3</del>	<del>7.9</del>	<del>7.8</del>	<del>7.7</del>	<del>7.6</del>	<del>8.0</del>	<del>8.1</del>	<del>7.2</del>	<del>6.0</del>	<del>8.3</del>
<del>7.3</del>	<del>8.3</del>	<del>7.2</del>	<del>8.6</del>	<del>7.4</del>	<del>8.0</del>	<del>8.5</del>	<del>8.1</del>	<del>7.7</del>	<del>8.8</del>
<del>8.3</del>	<del>8.1</del>	<del>8.8</del>	<del>6.9</del>	<del>5.8</del>	<del>7.6</del>	<del>7.2</del>	<del>7.5</del>	<del>6.7</del>	<del>6.3</del>

The weights are given in U.S. pounds

- Group the data into the intervals 5.6–6.0, 6.1–6.5, 6.6–7.0, etc. Construct the corresponding frequency table.

SEE ATTACHED SHEET.

- On a separate sheet of graph paper, construct the corresponding histogram.

SEE ATTACHED SHEET.

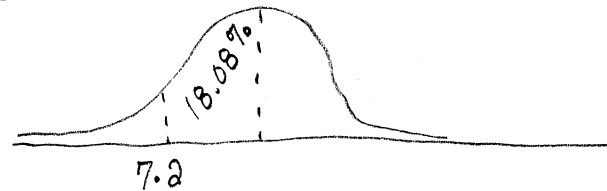
- Find the mean and the standard deviation of the birth weights in the data set.

CALCULATOR:  $\bar{x} = 7.586, \sigma = 0.82777$

- Assume that the weights in the data set are samples from a normal distribution with mean and standard deviation as found above. If 550 infants are selected from this population, about how many had birth weights less than 7.2 lbs?

Z-score for 7.2 lbs

$$= \frac{7.2 - 7.586}{0.82777} = -0.46631... \approx -0.47$$



31.92%

31.92% of 550

$$= 175.56$$

≈ 176 BABIES

(lbs) BIRTH WEIGHT	Tally	Frequency
5.6 - 6.0	II	2
6.1 - 6.5	III	3
6.6 - 7.0		4
7.1 - 7.5		5
7.6 - 8.0		5
8.1 - 8.5		5
8.6 - 9.0		4
9.1 - 9.5		0
9.6 - 10.0	I	1

