

**Math 236: Review for Test 2**

Name: \_\_\_\_\_

Review (10 pts) \_\_\_\_\_ / 10

You will need a calculator (any type is fine) for the exam. You may have a 3 x 5 card (both sides) with formulas on it. No formulas will be given on the test so make sure you put down any formula that you think you'll need!

The review problems are a good indication of most, but not necessarily all, of the types of problems that will be on the the exam.  
**Be sure to also review your notes!**

**You will be using Minitab on the exam to solve some of the problems.**

What you should be able to do using Minitab:

- Find the mean, median, standard deviation, and quartiles for a set of data
- Find the equation of the Line of Best Fit for a set of (x,y) data (regression equation)
- Find the r-value (Pearson Correlation Coefficient)

<p><b>Section 3.3 Practice for Exam:</b>                  1<sup>st</sup> edition: Section 3.3, page 139: 22, 24, <b>28a – f</b>                  Chapter 3 Review page 145: 13</p> <p>2<sup>nd</sup> edition: Section 3.3, page 142: 22, 24, <b>28a – f</b>                  Chapter 3 Review page 149: 13</p> <p><b>Even Answers: Located at the end of the assignment (look below)</b></p>	<input style="width: 40px; height: 30px;" type="text"/> /4
<p><b>Chapter 4 Practice for Exam:</b>                  1<sup>st</sup> edition: Chapter 4 Quiz, page 187: 3, 4, 5, 6, 7 (On #6 and 7, x = Delay Time, NOT the year!)                  Chapter 4 Write About It, page 190: 1, 7</p> <p>2<sup>nd</sup> edition: Chapter 4 Quiz, page 190: 3, 4, 5, 6, 7 (On #6 and 7, x = Delay Time, NOT the year!)                  Chapter 4 Write About It, page 194: 1, 7</p> <p><b>Even answers are in the back of the text.</b></p>	<input style="width: 40px; height: 30px;" type="text"/> /7
<p><b>Chapter 5 Practice for Exam:</b>                  1<sup>st</sup> edition: Chapter 5 Quiz, page 235: 1 – 12 all                  Chapter 5 Review Exercises, page 236: 2, 3a, 10, 11</p> <p>2<sup>nd</sup> edition: Chapter 5 Quiz, page 240: 1 – 12 all                  Chapter 5 Review Exercises, page 241: 2, 3a, 10, 11</p> <p><b>Even answers are in the back of the text.</b></p>	<input style="width: 40px; height: 30px;" type="text"/> /16
<p><b>Chapter 6 Practice for Exam:</b>                  1<sup>st</sup> edition: Chapter 6 Quiz, page 271: 1, 4, 5, 6, 7, 8                  Chapter 6 Review Exercises, page 272: 5, 6, 7</p> <p>2<sup>nd</sup> edition: Chapter 6 Quiz, page 278: 1, 4, 5, 6, 7, 8                  Chapter 6 Review Exercises, page 280: 5, 6, 7</p> <p><b>Note:</b> On Review Exercise #7, be able to interpret the answer in practical terms: “If you played craps and made that same bet a large number (say, 1000) of times, then you average loss PER GAME would be \$0.11. This means you would expect to lose about 1000 x \$0.11= \$110 average, if you kept playing all 1000 of those games.</p> <p><b>Even answers are in the back of the text.</b></p>	<input style="width: 40px; height: 30px;" type="text"/> /9

**Even answers for Section 3.3:**

#22: (a)  $z = 1.33$  (b)  $z = 1$  (c) Anna's fish is relatively longer (d) Fish's length was 147.6 mm  
(e) Fish's length was 148 mm

#24: (a) IQR = 15 (b) Lower boundary = 77.5; Upper boundary = 137.5 (c) Yes, 140 would be an outlier.

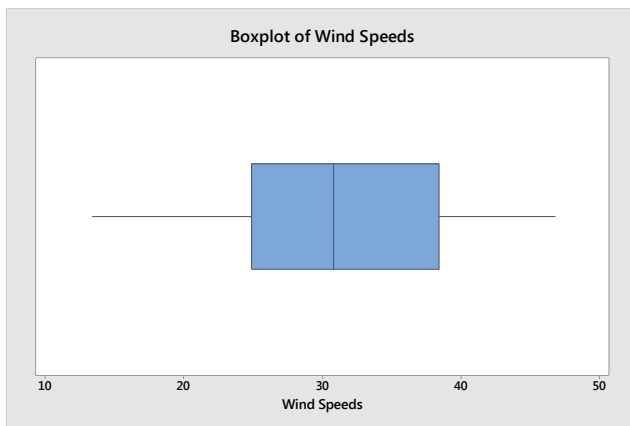
#28: (a)  $Q1 = 24.90$ ;  $Q3 = 38.40$  (b) Median = 30.8 (c) Lower boundary = 4.65; Upper boundary = 58.65  
(d) No outliers (e) See Boxplot above. (f) Slightly asymmetric (median is not in center of box) and slightly skewed to the left (whisker on the left is slightly longer).

For #28, here are the Descriptive Statistics from Minitab:

**Descriptive Statistics: Wind Speeds**

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Wind Speeds	29	0	30.89	1.60	8.64	13.40	24.90	30.80	38.40	46.80

Answer for #28e)



### Chapter 3 Concepts to study:

- Find the z-score of a data value,  $x$ .
  - Interpret the z-score in terms of how many standard deviations a data value is from the mean.
  - Know what z-scores correspond to unusual data values
  - Know what the sign of a z-score signifies, i.e., whether a data value is to the right (positive z-score) or left (negative z-score) of the mean.
- Find a data value,  $x$ , based on a z-score.
- Know the meaning of “percentile”:  $k$  percent of the data is BELOW the  $k$ th percentile.
- Know what Quartiles are. Know that Q2 is the Median of a data set.
- Find the Inner Quartile Range ( $IQR = Q3 - Q1$ ).
  - Use the IQR to find the upper and lower outlier boundaries.  
Lower =  $Q1 - 1.5IQR$ , Upper =  $Q3 + 1.5IQR$
  - Use the outlier boundaries to identify outliers.
- Know what the Five Number Summary is: Min, Q1, Median, Q3, Max.
- Use the Five Number Summary to construct a Boxplot.
- Use a Boxplot to determine
  - symmetry of a data set (median is not at the center for an asymmetrical data set)
  - skewness (whiskers are longer on right for right skew, longer on left for left skew)
  - outliers (the \* symbol is used by Minitab to indicate outliers)

### Chapter 4 Concepts to study:

**Identify linear associations** from a scatterplot.

**Find the equation of the Line of Best Fit**, using Minitab. Use this equation to find and interpret values.

**Find the (Pearson) Correlation Coefficient** using Minitab. Interpret its value as strong, weak, positive, or negative association between the variables.

**Know the characteristics of the Correlation Coefficient,  $r$** , and relate to a given scatterplot.

- $-1 \leq r \leq 1$  The  $r$ -value is between -1 and 1.
- Perfect positive correlation (upward trend) has an  $r$ -value of 1
- Perfect negative correlation (downward trend) has an  $r$ -value of -1
- A weak linear association has an  $r$ -value close to 0.
- The  $r$ -value is **not resistant**; in other words, outliers can seriously affect its value and thus lead to incorrect conclusions.
- Use the Regression Line Equation to find values (such as the  $y$ -intercept) and determine their meaning in the context of the problem.

**Know that “Correlation is not Causation”**; i.e., just because there is a strong correlation between two things (such organic food sales and autism) does NOT mean that one caused the other.

**Know that extrapolation can lead to incorrect conclusions and must be done with caution:**

Extrapolation means making predictions beyond the data values. You have to assume all conditions will remain the same in order to extrapolate.

## Chapter 5 Concepts to study:

- Given the description of a probability problem, be able to find
  - the sample space
  - the probability of an event
- Know the difference between Empirical Probability (you did the experiment) and Theoretical Probability (you just thought about what could happen).
- Know the Law of Large Numbers. (If you do the experiment, like flipping a coin, a large number of times then your Empirical Probability results will get closer and closer to the Theoretical Probability.)
- Identify Mutually Exclusive events. (They can't both happen.)
  - Find probability for M.E. events with "OR" statements (Addition Rule).
- Find probability using the General Addition Rule, with "OR" and "AND".
- Find or identify the complement (negation) of an event.
  - Find the probability of complementary events.
  - Know the complement of "at least one" is "none" and vice versa.
- Identify Independent or Dependent events (For Dependent Events, one event happening changes the probability for the next event to happen. There is an association between the events, they're related in some way. If there's no association, the events are Independent.)
- Know the Multiplication Rule for finding probability.
- Construct a Contingency Table and use it to find probability.
  - Find Conditional Probability (the word "given" tells you it's conditional)

## Chapter 6 Concepts to study:

- Distinguish between a Continuous Random Variable and a Discrete Random Variable
- Set up a probability distribution, such as for flipping a coin several times or having several children.
- Identify a probability distribution (sum of probabilities is 1)
- Given a probability distribution, find the following:
  - mean
  - variance
  - standard deviation
- Given a profit/loss investment or win/lose game situation, be able to
  - set up a Payoff Table
  - find the Expected Value of the investment/game
  - interpret the Expected Value in terms of the Law of Large Numbers