Greetings Parents and Guardians,

3/16/2020

Listed below is some pertinent information for you and your student as we move forward with the 2019-2020 school year. Please rest assured that I am working diligently to ensure that your student will continue to receive valuable instruction and practice while away from the school building. If at any time you have any questions or concerns, please don’t hesitate to contact me.

Respectfully,

Paul B. Barrera
Mathematics Teacher, Granby High School
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There are multiple ways for you and/or your student to communicate with me. Additionally, it is equally important that I’m able to reach you or your student to convey important information and materials. Please make sure that you and/or your student regularly check Synergy or Google Classroom for communication and assignments. Below are the available modes of communication:

1. Synergy
   - I will be sending regular e-mail messages to students and parents regarding class updates, work assignments, and due dates. You and/or your student can access my NPS e-mail through Synergy, as well.
   - Assignments and video tutorials will be uploaded into Synergy and available for access through StudentVue and Parent Portal. Students may print out their work to complete it or they may complete it on a separate sheet of paper.
   - The Synergy Assignment Dropbox will be opened for submissions of student work. Assignments can be submitted by scanning and uploading them into the Dropbox. If students do not have access to a scanner, they may take a picture of their work and upload it to the Dropbox.

2. Google Classroom
   - I will be posting regular messages to the discussion board in Google Classroom regarding class updates, work assignments, and due dates. Students will be able to communicate with me using the same discussion board, or by sending me an e-mail. If your student hasn’t joined our class in Google Classroom, the code is xy6xzvt.
   - Assignments and video tutorials will be uploaded into the class folder. Students may print out their work to complete it or they may complete it on a separate sheet of paper.
   - Student may submit their assignments by scanning and uploading them into Google Classroom. If students do not have access to a scanner, they may take a picture of their work and upload it.

In addition, assignments such as unit progress reports, FRQ’s and more, will be utilized from AP classroom.

Best Regards,

Paul B. Barrera
## AP Statistic - Unit 7 significance test and Chi square test

*Subject to be changed*

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<tr>
<th>Date</th>
<th>Topics</th>
<th>Assignment</th>
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</thead>
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<td>Significance tests: the basics</td>
<td>7.1 - Handout</td>
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<tr>
<td>Thurs 3/5</td>
<td>Significance tests with population proportions</td>
<td>7.2A - Handout</td>
</tr>
<tr>
<td>Mon 3/9</td>
<td>Significance tests with population difference of proportions</td>
<td>7.2B - extended</td>
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<tr>
<td>Wed 3/11</td>
<td>Significance tests for population means</td>
<td>7.3 - Handout</td>
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<td>Fri 3/13</td>
<td>Significance tests for difference of means and matched pairs</td>
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<td>Tues 3/17</td>
<td>Quiz 7.1</td>
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<td>Thurs 3/19</td>
<td>Chi Square testing (Khan academy video)</td>
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<tr>
<td>Mon 3/23</td>
<td>Chi Square testing (Khan academy video)</td>
<td>7.4B (see Google CR)</td>
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<td>Wed 3/25</td>
<td>Quiz 7.2</td>
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<td>Fri 3/27</td>
<td>FRQ</td>
<td>FRQ</td>
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<td>Tues 3/31</td>
<td>Test review</td>
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<td>Thurs 4/2</td>
<td>Unit 7 test</td>
<td>TBA</td>
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</table>

**AP exam review and mock tests (TBA)**

1. Thurs 4/2
2. Mon 4/6
3. Wed 4/8
4. Fri 4/10
5. Tues 4/21
6. Thurs 4/23
7. Mon 4/27
8. Wed 4/29
9. Fri 5/1
A contract between a manufacturer and a consumer of light bulbs specifies that the mean lifetime of the bulbs must be at least 1000 hours. As part of the quality assurance program, the manufacturer will institute an inspection program for each day's production of 10,000 units. An ordinary testing procedure is difficult since 1000 hours is over 41 days! Since the lifetime of a bulb decreases as the voltage applied increases, a common procedure is to perform an accelerated lifetime test in which the bulbs are lit using 400 volts (compared to the usual 110 volts). At such a voltage, a 1000-hour bulb is expected to last only 3 hours. This is a well-known procedure, and both sides have agreed that the results from the accelerated test will be a valid indicator of lifetime of the bulb.

The manufacturer will test the hypotheses $H_0 : \mu = 3$ versus $H_a : \mu < 3$ at the $\alpha = 0.01$ level with an SRS of 100 bulbs.

(a) Describe what a Type I error would be in this context.

(b) Describe what a Type II error would be in this context.

(c) Which error—Type I or Type II—is likely to do more damage to the manufacturer's relationship with the consumer? Explain.

(d) The manufacturer determines that the power of this test (when $\alpha = 0.01$) against the alternative $\mu = 2.8$ is 0.42. Explain what this means in context.

(e) Describe two ways the manufacturer can increase the power of this test.
2. A consumer advocacy group tests the mean vitamin C content of 50 different brands of bottled juices using, in each case, a t-test of significance in which the null hypothesis is the mean amount of vitamin C that is on the nutrition facts label for that brand of juice. They find that two of the 50 juice brands have statistically significantly lower Vitamin C than claimed at the \( \alpha = 0.05 \) level.

(a) In the context of this study, what does “statistically significant” mean?

(b) Is this an important discovery? Explain.

3. Tai Chi is often recommended as a way in improve balance and flexibility in the elderly. Below are before-and-after flexibility ratings (on a 1 to 10 scale, 10 being most flexible) for 8 men in their 80’s who took Tai Chi lessons for six months.

<table>
<thead>
<tr>
<th>Subject</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility rating after Tai Chi</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Flexibility rating before Tai Chi</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Do these paired data adequately meet the Normality condition for a t-procedure? Justify your answer.
The germination rate of seeds is defined as the proportion of seeds that, when properly planted and watered, sprout and grow. A certain variety of grass seed usually has a germination rate of 0.80, and a company wants to see if spraying the seeds with a chemical that is known to change germination rates in other species will change the germination rate of this grass species. They spray 400 seeds with the chemical, and 307 of the seeds germinate. This produces a 95% confidence interval for the proportion of seeds that germinate of (0.726, 0.809).

(a) Suppose the company conducted a test of \( H_0 : p = 0.8 \) against the alternative \( H_a : p \neq 0.8 \), using \( \alpha = 0.05 \). Use the confidence interval to determine whether this test would reject or fail to reject the null hypothesis. Explain your reasoning.

(b) Find the \( P \)-value for the test described in part (a). You do not need to present a complete significance test. Explain what the \( P \)-value measures in the context of the problem.

The Environmental Protection Agency has determined that safe drinking water should contain no more than 1.3 mg/liter of copper. You are testing water from a new source, and take 30 water samples. The mean copper content in your samples is 1.36 mg/l and the standard deviation is 0.18 mg/l. There do not appear to be any outliers in your data.

(a) Do these samples provide convincing evidence at the \( \alpha = 0.05 \) level that the water from this source contains unsafe levels of copper? Justify your answer. (find \( p \)-value, using the formula and state entire conclusion)

(b) How would your conclusion change if your sample mean had been 1.355 mg/l? What point does this make about statistical significance?
In a study of heart surgery, one issue was the effect of drugs called beta-blockers on the pulse rate of patients during surgery. The available subjects were divided at random into two groups of 30 patients each. One group received a beta-blocker; the other group received a placebo. The pulse rate of each patient at a critical point during the operation was recorded. The treatment group had a mean pulse rate of 65.2 and standard deviation 7.8. For the control group, the mean pulse rate was 70.3 and the standard deviation was 8.3.

(a) Find the standard error for the difference in mean pulse rate between the two groups.

\[ \text{use formula} \]

(b) Construct and interpret a 99% confidence interval for the difference in mean pulse rates.

\[ \text{use formula} \]

(c) Suppose we want to test the hypothesis that beta-blockers reduce mean pulse rate. State the null and alternative hypotheses for this test.

(d) The test statistic is \( t = -2.453 \). Determine the \( P \)-value and draw an appropriate conclusion, using \( \alpha = 0.05 \).
Do a complete write-up.
Just before the presidential election in November 2008, a local newspaper conducted a poll of residents of a medium-sized city and found that 120 out of a simple random sample of 250 men intended to vote for Barack Obama and 132 out of a simple random sample of 240 women intended to vote for Obama.

(a) Is this convincing evidence that there was a gender difference in Obama’s support in this city? Support your conclusion with a test of significance, using $\alpha = 0.05$.

(b) Construct (using the formula) a 95% confidence interval to EXPLAIN whether or not the above conclusion has been supported.