Text: Stocks

1. Define each term in the following list.
   1.01. Null Hypothesis ($H_0$)
   1.02. Alternate Hypothesis ($H_A$)
   1.03. Type I Error
   1.04. Type II Error
   1.05. alpha level ($\alpha$)
   1.06. beta level ($\beta$)

2. We know that the national average for the Social Work Skills (SWS) test was $\mu_Y = 83$. We have administered the SWS test to a randomly selected group of $n = 81$ social work students. The average score for this group was $Y = 86$ with a standard deviation of $s_Y = 12.6$. We calculate $t_{obt}$ for a single sample Student $t$ test as

   $$ t_{obt} = \frac{Y - \mu_Y}{s_Y} $$

   where
   - $\mu_Y$ refers to the population mean,
   - $Y$ refers to the sample mean, and
   - $s_Y$ refers to the estimated standard error of the mean.

   For non-directional $\alpha_2 = .05$, give the values for $t_{obt}$ and $t_{crit}$ to three decimal places. Use the table of critical values for the Student $t$ statistic in your text to find $t_{crit}$ at a non-directional $\alpha_2 = .05$.

   Please show all work on a separate sheet and type your answers on your answer sheet.

   2.01. $Y - \mu_Y$ = ________________
   2.02. $s_Y$ = ________________
   2.03. $t_{obt}$ = ________________
   2.04. $df$ = ________________
   2.05. $t_{crit}$ = ________________
   2.06. Was the difference between sample and population means statistically significant at a non-directional $\alpha_2 = .05$? Why or why not?
3. We suspect that there has been systematic discrimination against children of farm workers in terms of the average amount of health program money spent per child per year. We know that the statewide average is $92.55.

We decide to carry out a non-directional single sample Student t test to evaluate the difference between average expenditure on farm worker children and the statewide average.

We shall carry out this test at the usual alpha level ($\alpha = .05$) and a power level of $1–\beta = 0.8$. We are interested in detecting a small to medium effect size ($d = 0.4$).

What should our total sample size ($n$) be?

4. Disposition proportions for first time juvenile felony offenders in our state were:
   - Pre-trial or pre-sentence diversion – 10%
   - Community program (juvenile probation) – 45%
   - Juvenile residential program – 18%
   - Probation (tried as an adult) – 19%
   - Jail or Prison (tried as an adult) – 8%

We are interested in whether disposition rates in our county differ from the overall state rates. We randomly selected 120 disposed felony cases with juvenile defendants with the results shown in Table 1.

<table>
<thead>
<tr>
<th>Disposition Categories</th>
<th>observed frequencies ($f_{ob}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversion</td>
<td>Juvenile Community</td>
</tr>
<tr>
<td></td>
<td>34</td>
</tr>
</tbody>
</table>

We wish to see if it is likely that our county rates differ from the state disposition rates at a statistically significant level ($\alpha = .05$).

Since outcome (dependent measure) categories are at the nominal level, we would use a goodness-of-fit $\chi^2$ test.

We calculate expected frequencies using the formula – $f_{Ex} = p_{Ex} \cdot n$ – where $p_{Ex}$ refers to the statewide percentages converted into proportions and $n$ refers to the number of cases in the sample. Table 2 shows the expected frequencies.

<table>
<thead>
<tr>
<th>Disposition Categories</th>
<th>expected frequencies ($f_{Ex} = p_{Ex} \cdot n$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversion</td>
<td>Juvenile Community</td>
</tr>
<tr>
<td></td>
<td>.10(120) = 12.0</td>
</tr>
</tbody>
</table>

The formula for $\chi^2_{obt}$ is $\chi^2_{obt} = \sum \left( \frac{f_{ob} - f_{Ex}}{f_{Ex}} \right)^2$

4.01. Retype Table 3 on your answer sheet and fill in the blanks.
Table 3: Calculation of $\chi^2_{\text{Obt}}$

<table>
<thead>
<tr>
<th></th>
<th>$f_{\text{Ob}} - f_{\text{Ex}}$</th>
<th>$(f_{\text{Ob}} - f_{\text{Ex}})^2$</th>
<th>$\frac{(f_{\text{Ob}} - f_{\text{Ex}})^2}{f_{\text{Ex}}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juvenile Community</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juvenile Residential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult Probation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jail or Prison</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For $\alpha = .05$ and the appropriate degrees of freedom, give the values for $\chi^2_{\text{Obt}}$ and $\chi^2_{\text{Crit}}$ to three decimal places.

4.02. $\chi^2_{\text{Obt}} = \underline{\phantom{000}}$

4.03. df = \underline{\phantom{000}}

4.04. $\chi^2_{\text{Crit}} = \chi^2_{(\text{df})}$ = \underline{\phantom{000}}

4.05. At $\alpha = .05$, should we reject the Null Hypothesis or fail to reject the Null Hypothesis?

4.06. Why or why not?

5. Identify the level of measurement:
Client rating of satisfaction with services provided as
0 = extremely dissatisfied, 1 = dissatisfied, 2 = marginally dissatisfied, 3 = neither satisfied nor dissatisfied,
4 = marginally satisfied, 5 = satisfied, 6 = extremely satisfied.

6. Identify the level of measurement:
Total score on the Generalized Contentment Scale (the sum of the item scores equals the total Generalized Contentment Scale score)

7. We randomly selected $n = 36$ students from sixth grade students referred for truancy from the 23 middle schools in the Thatcher independent school district. Table 4 shows the numbers of unexcused absences for the 36 students in the sample for the six weeks before referral.

Table 5 shows the statewide records for sixth graders on unexcused absences over the six weeks prior to referral for truancy.

We wish to know whether sixth graders referred for truancy in the Thatcher independent school district show statistically significant differences ($\alpha = .05$) in unexcused absent days from the statewide population of sixth graders referred for truancy.

Table 4: Thatcher District (Sixth Grade)

<table>
<thead>
<tr>
<th>Unexcused Absent Days</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 – 36</td>
<td>2</td>
</tr>
<tr>
<td>17 – 24</td>
<td>9</td>
</tr>
<tr>
<td>13 – 16</td>
<td>11</td>
</tr>
<tr>
<td>9 – 12</td>
<td>7</td>
</tr>
<tr>
<td>7 – 8</td>
<td>4</td>
</tr>
<tr>
<td>5 – 6</td>
<td>3</td>
</tr>
<tr>
<td>0 – 4</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 5: Statewide (Sixth Grade)

<table>
<thead>
<tr>
<th>Unexcused Absent Days</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 – 36</td>
<td>3%</td>
</tr>
<tr>
<td>17 – 24</td>
<td>22%</td>
</tr>
<tr>
<td>13 – 16</td>
<td>23%</td>
</tr>
<tr>
<td>9 – 12</td>
<td>22%</td>
</tr>
<tr>
<td>7 – 8</td>
<td>13%</td>
</tr>
<tr>
<td>5 – 6</td>
<td>6%</td>
</tr>
<tr>
<td>0 – 4</td>
<td>1%</td>
</tr>
</tbody>
</table>
7.01. The independent variable in this study refers to which of the following.
- groups compared
- referral status
- (1) referred, (2) not referred
- (1) sixth grade, (2) seventh grade, (3) eighth grade
- (1) Thatcher district, (2) statewide
- truancy
- unexcused absent days

7.02. Levels of the independent variable in this study refer to which of the following.
- groups compared
- referral status
- (1) referred, (2) not referred
- (1) sixth grade, (2) seventh grade, (3) eighth grade
- (1) Thatcher district, (2) statewide
- truancy
- unexcused absent days

7.03. The dependent variable in this study refers to which of the following.
- groups compared
- referral status
- (1) referred, (2) not referred
- (1) sixth grade, (2) seventh grade, (3) eighth grade
- (1) Thatcher district, (2) statewide
- truancy
- unexcused absent days

7.04. The dependent measure in this study refers to which of the following.
- groups compared
- referral status
- (1) referred, (2) not referred
- (1) sixth grade, (2) seventh grade, (3) eighth grade
- (1) Thatcher district, (2) statewide
- truancy
- unexcused absent days

7.05. Identify the level of measurement (Nominal, Ordinal, Interval, or Ratio) for the dependent measure in this study.

7.06. Which, if any, of these statistical test(s) would be appropriate?
- Goodness-of-fit chi-square test
- Single sample Kolmogorov-Smirnov test
- Single sample Student t test
- None of these tests is appropriate

7.07. Please explain your conclusion. Describe how this study meets or does not meet each of the two most important assumptions for statistical hypothesis testing. If you chose a specific test, describe how the study meets the additional assumptions for the specific test chosen. Your discussion of the assumptions must support your conclusion about which, if any, test is appropriate. The research design is an important issue in test selection. Your entire explanation should contain fewer than 200 words.