PREPARING INSTRUCTORS FOR A COREQUISITE STATISTICS PATHWAY

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WHAT IS CO-REQUISITE REMEDIATION?

- Co-requisite remediation is an approach to developmental education that places students in entry-level college courses while they simultaneously receive remedial academic support.
WHY CO-REQUISITE?

• City University of New York

• Complete College America Report includes Case Studies from states that have implemented co-requisite models and a blueprint for developing a co-requisite model.
PREREQUISITE SKILLS YOUR STUDENTS NEED

Numerical Skills

• Fractions to Decimals
• Decimals to Fractions
• Ordering Decimals
• Operations on Decimals
• Ordering Decimals
• Squaring, Square Roots, some Order of Operations
• Scientific Notation
**Side Effects** In a study for a new medicine suppose \( \frac{1}{8} \) of the participants experienced headaches as a side effect, \( \frac{1}{12} \) experienced nausea as a side effect, and \( \frac{1}{24} \) experienced both headaches and nausea as a side effect.

(a) Determine the fraction of study participants who experienced either a headache or nausea as a side effect by evaluating \( \frac{1}{8} + \frac{1}{12} - \frac{1}{24} \). Express the result as a fraction in lowest terms.

(b) If there were 1200 participants in the study, determine the number who experienced either headache or nausea as a side effect.
\[ \sqrt{\frac{(20 - 11)^2 + (13 - 11)^2 + (4 - 11)^2 + (8 - 11)^2 + (10 - 11)^2}{4}} \]

\[ \sqrt{\frac{(3 - 9)^2 + (6 - 9)^2 + (12 - 9)^2 + (14 - 9)^2 + (10 - 9)^2}{5}} \]
PREREQUISITE SKILLS YOUR STUDENTS NEED

Algebraic Skills

• Evaluating expressions
• Summation notation
• Simple linear equations
• Linear equations in two variables (slope-intercept).
• Inequalities and Interval Notation
\[
\sum_{i=1}^{6} (4i - 3) \div 6
\]

\[
\sum_{i=1}^{5} (4i - 12)^2 \div 4
\]

\[
10p^3(1-p)^2; \ p = 0.2
\]

\[
\sum_{i=1}^{3} (x_i - \mu)^2; \ x_1 = 4, x_2 = 8, x_3 = 9, \mu = 7
\]

\[
\sum_{i=1}^{4} (x_i - \mu)^2 \div 4; \ x_1 = 3, x_2 = 4, x_3 = 7, x_4 = 2, \mu = 4
\]

\[
\frac{x - \mu}{\sigma}; \ x = 120, \mu = 100, \sigma = 15
\]

\[
z\sigma + \mu; \ z = 2, \sigma = 10, \mu = 50
\]

\[
4p^3(1-p); \ p = 0.4
\]
Concrete As concrete cures, it gains strength. The data below represent the 7-day and 28-day strength (in pounds per square inch) of a certain type of concrete.

<table>
<thead>
<tr>
<th>7-day Strength, $x$</th>
<th>28-day Strength, $y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2300</td>
<td>4070</td>
</tr>
<tr>
<td>3390</td>
<td>5220</td>
</tr>
<tr>
<td>2430</td>
<td>4640</td>
</tr>
<tr>
<td>2890</td>
<td>4620</td>
</tr>
<tr>
<td>3330</td>
<td>4850</td>
</tr>
<tr>
<td>2480</td>
<td>4120</td>
</tr>
<tr>
<td>3380</td>
<td>5020</td>
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<tr>
<td>2660</td>
<td>4890</td>
</tr>
<tr>
<td>2620</td>
<td>4190</td>
</tr>
<tr>
<td>3340</td>
<td>4630</td>
</tr>
</tbody>
</table>

(a) Draw a scatter diagram of the data, treating 7-day strength as the $x$-variable.
(b) What type of relation appears to exist between 7-day strength and 28-day strength?
(c) Select two points and find an equation of the line containing the points.
(d) Graph the line on the scatter diagram drawn in part (a).
(e) Predict the 28-day strength of a slab of concrete if its 7-day strength is 3000 psi.
(f) Interpret the slope of the line found in part (c).
OTHER STUDENT NEEDS

Soft (or Study) Skills

- Time management
- Metacognition – students are unaware of what it takes to learn
- Poor note-taking skills; weak organization skills
  - Classroom Notes
- Email reminders
- Grit/Perseverance/Growth Mindset (Affective Domain)
  - Failure is the key to growth (Ray Dalio from *principles* pg 37)
COREQUISITE BEST PRACTICES

• Homogenous grouping
• Same instructor
• Avoid homework from Prereq content.
• Formative Assessment/Group Work
  – Collaborative Work/Peer-to-Peer Instruction
STATS – NO COMPUTATION

Statistics is not mathematics. Statistics is about using data to make informed decisions. It is not about computation, formulas, and tables. Math is to Statistics as Math is to Physics.
THE STATS COURSE - TECHNOLOGY

- StatCrunch
- Minitab
- JMP
- Statistical applets
- Avoid the calculator or Excel
STATS TEACHING RESOURCES

• Colleagues – sit in on a course.
• Read Guidelines for Assessment and Instruction in Statistics Education
• AMATYC Statistics Resource Page
  – https://amatyc.site-ym.com/page/StatsResources
• American Statistical Association Statistics Resource Page (Great Links)
  – https://community.amstat.org/statisticaleducationsection/home
• CAUSE (Consortium for the Advancement of Undergraduate Statistics Education)
  – https://www.causeweb.org/cause/
• ARTIST (Assessment Resource Tools for Improving Statistical Thinking)
  – https://apps3.cehd.umn.edu/artist/
• USCOTS and eCOTS