



power_law_computation

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In standards-based grading, a student's standard score may reflect the average for the standard, which is calculated by adding all scores for all assignments associated with the standard, and dividing by the number of assignments. Or, the student's score may be calculated using the Power Law computation. The higher of the two is always displayed as the student's standard score, unless the instructor has entered an override score.

The Power Law computation is based on the idea that a student's later scores should have more weight than his earliest scores, because later scores are more reflective of the student's accumulated knowledge.

The nonlinear power law equation is $y = m \cdot x^b$, where:

- y is the score that is being predicted or computed.
- x is the score on which the prediction is based, indicating the number of practices the student has had for the standard. For example, if the student has had three assessments to date, starting with a homework assignment, then a quiz, and then a test, the x score for the homework assignment would be 1, for the quiz would be 2, and for the test would be 3. Each score must have a corresponding assessment number.

Steps:

- Calculate the log of x and the log of y for all possible x values and all possible y values.
- Use the log values for x and y in the linear equation $y = mx + b$ (i.e., $\log(y) = m \cdot \log(x) + b$).
- Solve for m in this linear equation to get the value for b for the nonlinear equation.

$$m = \frac{\sum xy - \left[\frac{\sum x \sum y}{N} \right]}{\sum x^2 - \left[\frac{(\sum x)^2}{N} \right]}$$

- Solve for b in this linear equation to get $\log(m)$. Calculate m using the formula $m = e^{\log(m)}$ to get the value for m in the nonlinear equation.

$$b = \frac{\sum y - m(\sum x)}{N}$$

- Use the new values for m and b in the nonlinear Power Law equation.



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