Multiple Regression
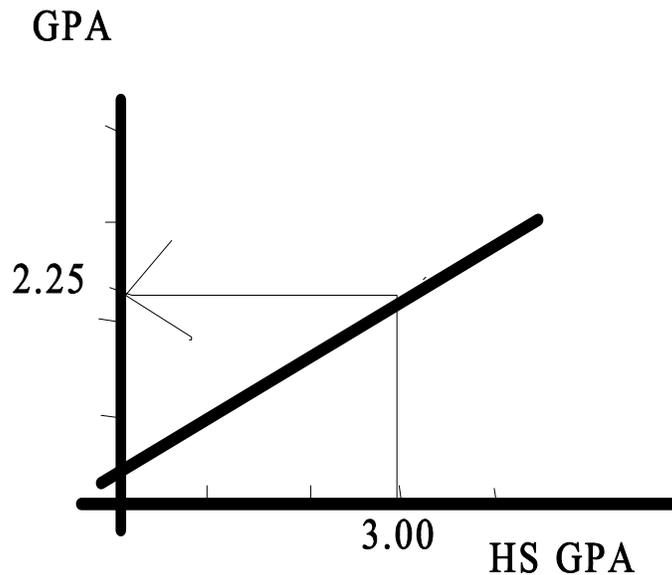
► When to use:
    1. Prediction
    2. Explanation

► A simple prediction equation

    $Y' = .15 + .70X$

        Y' -- predicted criterion or DV (e.g., GPA)
        X -- Predictor or IV (e.g., HS GPA)

GPA

► How good is the prediction?

    $r\ (Y \text{ and } Y') = r\ (X \text{ and } Y)$

► Coefficient of determination

r^2 -- Percentage of criterion score variance that is predictable

Example: if r (HS GPA and GPA) = .80
  then r^2 = .64   64%

► A multiple regression prediction equation

$$Y' = .20 + .50X_1 + .002X_2 - 5X_3$$

Y' -- Predicted criterion or DV (e.g., GPA)
X_1 -- Predictor or IV (e.g., HS GPA)
X_2 -- Predictor or IV (e.g., exam score)
X_3 -- Predictor or IV (e.g., absence rate)

Example:
  For a student,
    HS GPA = 3.00
    A score on the entrance exam = 600
    Absence rate .02 (2 days / 100 days)

  Y' = .20 + .50(3.00) + .002(600) -5(.02)
    = 2.80

► The coefficient of multiple correlation (R)

$$R = r \ (Y \text{ and } Y')$$

► The coefficient of determination

R^2 -- Percentage of criterion score variance that is predictable by multiple X's

Example: if R = .80
Then R^2 = .64   64%

► Regression coefficients and beta weights

Regression coefficients -- different scales

Cannot be compared against one another

Beta weights -- same scales (same mean and sd)

Can be compared against one another

► Tests of significance in multiple regression

The prediction equation is sample dependent.

1. Is the researcher's obtained R significantly different from zero?

2. Is one R significantly different from a second R? (Whether the addition of one or more predictor variables will lead to a significant increase in R.)

3. Is a particular beta weight significantly different from zero?

► Cross validation
Does your regression equation work successfully for a new group of individuals?

1. Divide into 2 groups. 2. Use one of the groups to develop the equation. 3. Use the equation to predict the criterion for the second group. 4. Correlate predicted and actual scores for the second group.