Variance, Covariance and correlation

1. **Continue with the wage exercise that we practiced in class. Complete the following:**

   (1) Calculate R-squared with the formula, and then calculate the correlation between wag e and education to verify the relationship between R-squared and correlation. Interpret the meaning of R-squared.

   (2) Use the formula for b1, prove that

   $$b1 = \hat{\rho}\frac{\widehat{\sigma_y}}{\widehat{\sigma_x}}$$

   What does this equation mean? (eg. b1 increases as … increases, decreases as …. decre ases)

   (3) Test the null hypothesis that $\beta_1 = 0$. Is there any significant evidence that the education affects wage? (you can calculate manually with the formula, or use the regression func tion in Excel, both are fine).

   (4) Test the null hypothesis that $\beta_1 \geq 0.8$. State your conclusion in detail.

   (5) (bonus) Make a scatter plot for wage (vertical axis) and education (horizontal axis). Doe s it look like the graphs we used in class? What are the differences? Does this dataset f ulfill the four conditions for running simple linear regression?