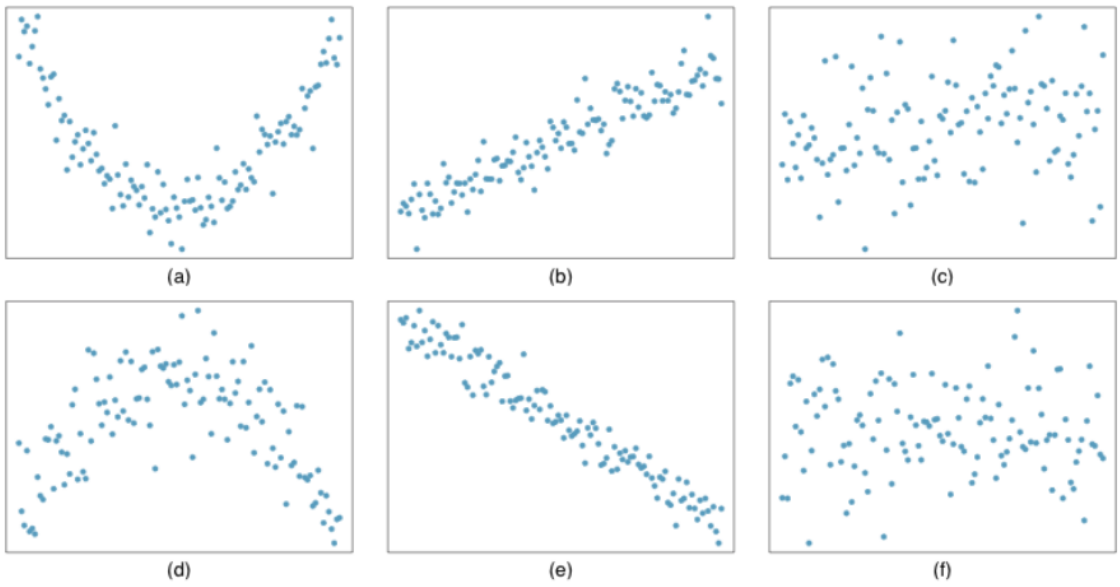
# STA13 Homework 6

November 22, 2021

1. Identify relationships For each of the six plots, identify the patterns of the relationship (linear or nonlinear), strength of the relationship (e.g. weak, moderate, or strong) in the data, whether fitting a linear model would be reasonable, and estimate the range of the correlation coefficients, .

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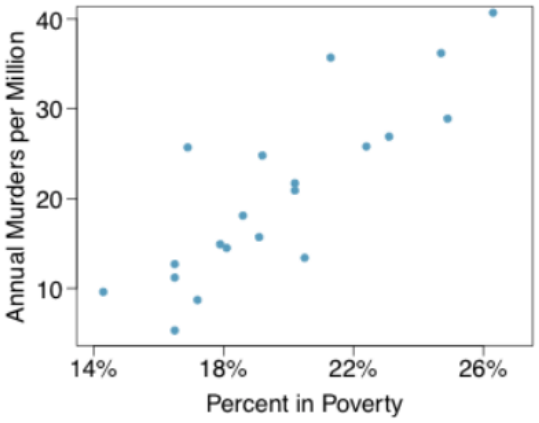
2. Murders and poverty The following regression output is for predicting annual murders per million from percentage living in poverty in a random sample of 20 metropolitan areas.




| | Estimate | Std. Error | t value | Pr(> \|t\|) |
|---|---|---|---|---|
| (Intercept) | −29.901 | 7.789 | −3.839 | 0.001 |
| poverty% | 2.559 | 0.390 | 6.562 | 0.000 |
| $s = 5.512$ | $R^2 = 70.52\%$ | $R^2_{\text{adj}} = 68.89\%$ | | |

1. Write out the linear model.
2. Interpret the intercept.
3. Interpret the slope.
4. What are the hypotheses for evaluating whether poverty percentage is a significant predictor of murder rate? State the conclusion of the hypothesis test in context of the data.
5. What is the predicted annual murders per million for 20% in poverty?

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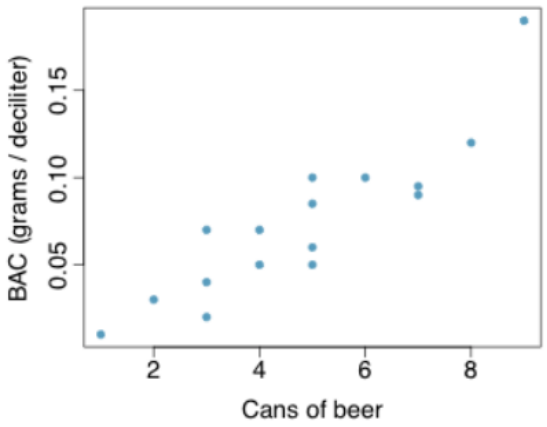
3. Beer and blood alcohol content. Many people believe that gender, weight, drinking habits, and many other factors are much more important in predicting blood alcohol content (BAC) than simply considering the number of drinks a person consumed. Here we examine data from sixteen student volunteers at Ohio State University who each drank a randomly assigned number of cans of beer. These students were evenly divided between men and women, and they differed in weight and drinking habits. Thirty minutes later, a police officer measured their blood alcohol content (BAC) in grams of alcohol per deciliter of blood. [19] The scatterplot and regression table summarize the findings.




| | Estimate | Std. Error | t value | Pr(> \|t\|) |
|---|---|---|---|---|
| (Intercept) | −0.0127 | 0.0126 | −1.00 | 0.3320 |
| beers | 0.0180 | 0.0024 | 7.48 | 0.0000 |

1. Write the equation of the regression line. Interpret the slope and intercept in context.

2. Do the data provide strong evidence that drinking more cans of beer is associated with an increase in blood alcohol? State the null and alternative hypotheses, report the p-value, and state your conclusion.

3. Suppose we visit a bar, ask people how many drinks they have had, and also take their BAC. Do you think the relationship between number of drinks and BAC would be as strong as the relationship found in the Ohio State study?