**Educational Attainment in Galloway, NJ**

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# Introduction

## Background

* + This Dataset is taken from ACS which is a survey conducted by the US which receives various information from representative households. Since this dataset includes data from Galloway and it includes information such as educational attainment when compared with median earnings, I believe it is a very good dataset to reference. The data also pertains to a lot of people in the course, along with myself.

## Objective

* + Examining the median earnings in Galloway when compared with educational attainment levels, age, or race. All of the original statistics are taken from the data census website:
    - <https://data.census.gov/table?q=Galloway+NJ&tid=ACSST5Y2021.S1501>
  + This will provide a better understanding of the financial and educational status of Galloway.

# Problems

## Chapter 2:

* 2.1:
  + Suppose a household has 3 people and we are interested in whether these people have a Bachelor’s Degree or not. Let *B* denote that a person has a bachelor's degree, while *N* denotes that a person does not have a bachelor’s degree. Defines a set S of possible observations where each person may either have a bachelor’s degree or not.
    - S = {BBB, BBN, BNB, BNN, NBB, NBN, NNB, NNN}
  + Let Z denote the subset of possibilities containing 1 or 2 Bachelors and let Y denote the subset of possibilities containing 0, 1, or 3 Bachelors. List the elements of Z, Y, Z ∩ Y, Z ∪ Y, and .
    - Z = {BBN, BNB, BNN, NBB, NBN, NNB}
    - Y = {BBB, BNN, NNB, NNN}
    - Z ∩ Y = {BNN, NNB}
    - Z ∪ Y = S = {BBB, BBN, BNB, BNN, NBB, NBN, NNB, NNN}
    - = {BBB, NNN}
* 2.2:
  + An Employer requests that 5 women between the ages of 18 and 24 who live in Galloway Township come to a specified location to be interviewed. The Employer assumes that each of them have a Bachelor’s Degree, but only 3 of the 5 women do. This employer has a hard time choosing which 2 to hire, and decides to pick 2 of them randomly. (This must be an absolutely terrible employer.)
  + A) List the sample space for this experiment.
    - Let the two without Bachelor’s Degrees be labeled N1 and N2 and the 3 with Bachelor’s Degrees be labeled B1, B2, and B3.
    - E1 = {N1, N2}; E2 = {N1, B1}; E3 = {N1, B2}; E4 = {N1, B3};
    - E5 = {N2, B1}; E6 = {N2, B2}; E7 = {N2, B3}; E8 = {B1, B2};
    - E9 = {B1, B3}; E10 = {B2, B3}
  + B) Let *A* denote that the employer picks 2 people with their Bachelors. List the Sample Points in A
    - A = {E8, E9, E10}
  + C) Find the probability of the events in the subset A.
    - Because A = E8 U E9 U E10, P(A) = 1/10 + 1/10 + 1/10 = 3/10.
* 2.3:
  + Suppose that 4 people between the ages of 18 and 24 will all eventually get a Bachelor’s Degree. These 4 can obtain their Bachelor’s in any order, so a surveyor wishes to determine how many different sequences could take place.
    - Since n = 4 people and then are going r = 4 at a time, the total number of sequences equals 4!/(4-4)! = 24.
* 2.4:
  + Suppose that a random person 25 years or older in Galloway Township is picked once. Use Definition 2.9 to find the probability that they have a Bachelor’s Degree or higher, given that they have a High School Diploma (Including Equivalents) or higher.
    - Define the 2 events.
    - A: They have a bachelor’s degree or higher.
    - B: They have a high school diploma or higher.
    - The P(A) in this instance is the amount of 25+ year olds who have a Bachelor’s Degree or higher divided by the number of 25+ year olds in Galloway. This is 8,189/26,033 = 0.31456 = 31.456%
    - The P(B) in this instance is the amount of 25+ year olds who have a High School Diploma or higher divided by the number of 25+ year olds in Galloway. This is 23,831/26,033 = 0.91542 = 91.542%
    - Also since A is a subset of B in this case, A ∩ B = A. So P(A ∩ B) = P(A) = 0.31456. So P(A | B) = 0.31456 / 0.91542 = 0.34362 = 34.362%
    - Thus 34.362% of 25+ year olds in Galloway have a Bachelor’s or higher given that they have a High School Diploma or higher.

## Chapter 3:

* 3.1:
  + A shop in Galloway has 3 18 year olds along with 3 27 year olds employed at their establishment. The manager wants to select 2 at random to leave early every day. Let Y denote the number of 18 year olds in his selection. Find the probability distribution for Y.
    - Since the manager is choosing 2 employees out of 6 there are going to be 6C2 = 15 sample points.
    - p(0) = P(Y = 0) = (0C3 \* 2C3)/15 = 3/15 = 1/5.
    - p(1) = P(Y = 1) = (1C3 \* 1C3)/15 = 9/15 = 3/5.
    - p(2) = P(Y = 2) = (2C3 \* 0C3)/15 = 3/15 = 1/5.
* 3.2:
  + There are 31,619 people 18 years or older in Galloway as of 2021. Suppose that 11,652 of them have some college experience or an associate degree. This means that 36.85% of the population above 18 in Galloway have some college experience or an associate degree. Suppose a sample of 3 people are taken, find the probability of at least one of them having some college experience or an associate degree.
    - P(at least 1 with college experience/associate degree) = 1 - p(0) = 1- 3C0 \* 0.3685^0 \* (1-0.3685)^3 = 1 - 0.2518 = 0.7482 = 74.82%

# Conclusion

Overall, I didn’t completely understand the instructions for this assignment. I did enjoy the fact that I could apply statistics to some degree to read life information on my home town of Galloway. Either way, I didn’t know how to apply the dataset I picked out to Chapter 1, and I don’t have a strong enough understanding of Chapters 4 or 5 to produce questions relating to my dataset.

I do believe that I understand the educational state of Galloway NJ better than I did before, so that simple goal was accomplished.