Assignment-4

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**Data**: The World Values Survey is an ongoing worldwide survey that polls the world population about perceptions of life, work, family, politics, etc. The most recent phase of the survey that polled 77,882 people from 57 countries estimates that 36.2% of the world's population agrees with the statement "Men should have more right to a job than women." The survey also estimates that 13.8% of people have a university degree or higher and that 3.6% of people fit both criteria.

**Question 1:** Are agreeing with the statement "Men should have more right to a job than women" and having a university degree or higher disjoint events?

**Ans:** P(agree) = 0.362

P (University Degree and higher) = 0.138

P (Agree and University Degree and higher) = 0.036

**Disjoint sets** are those sets whose intersection with each other results in a null set but by the given data we can see that the resultant is null/zero hence they are not disjoint sets.

**Question 2:** Draw a Venn diagram summarizing the variables and their associated probabilities.

**Ans: A B**

0.036

0.102

0.326

Ew7

P(A)= P(agree) = 0.362

P(B)= P (University Degree and higher) = 0.138

P(A ∩ B)= P (Agree and University Degree and higher) = 0.036

P(A-B) = P (People who only agree) = 0.362-0.036=0.326

P(B-A) = P (People who are only educated with college degree or higher) = 0.138-0.036 = 0.102

**Question 3**: What is the probability that a randomly drawn person has a university degree or higher or agrees with the statement about men having more right to a job than women?

**Ans**: P (Agree or University Degree) = P (A or B) P (A or B) = P(A) + P(B) – P (A and B) = 0.362 + 0.138 – 0.036 = 0.464

So, 46% is the probability that a randomly drawn person has a university degree or higher or agrees with the statement about men having more right to a job than women

**Question 4:** What percent of the world population do not have a university degree and disagree with the statement about men having more right to a job than women?

**Ans:** P (Does not agree nor no university degree) = 1 – P (agree or university degree) = 1 – 0.464 = 0.536

So, 53% of the world population do not have a university degree and disagree with the statement about men having more right to a job than women?

**Question 5**: Does it appear that the event that someone agrees with the statement is independent of the event that they have a university degree or higher?

**Ans**: If A and B are independent events, then P(A│B) = P(A)

Using Multiplication rule of probability,

P(A ∩ B) = P(B) .P(A│B)

0.036=0.138\*0.362

Since , P(A ∩ B) is not equal to P(B) .P(A│B) they are not independent

**Question 6:** What is the probability that at least 1 in 5 randomly selected people to agree with the statement about men having more right to a job than women?

**Ans:** P (no one agree) = 1 – P(agree)

= 1 – 0.362 = 0.638

P (at least one agrees) = 1- P (none agree)

= 1 – 0. 6385 = 0.894

**II. Data:** As of 2009, Swaziland had the highest HIV prevalence in the world. 25.9% of this country's population is infected with HIV. The ELISA test is one of the first and most accurate tests for HIV. For those who carry HIV, the ELISA test is 99.7% accurate. For those who do not carry HIV, the test is 92.6% accurate. If an individual from Swaziland has tested positive, what is the probability that he carries HIV? Create a tree diagram to calculate the probability.

**Question 1:** If an individual from Swaziland has tested positive, what is the probability that he carries HIV?

**Ans:** ELISA test-----> do not carry HIV------>92.6% accurate

ELISA test-----> carry HIV------>99.7% accurate

Carry HIV----->Positive-------> 0.258233

Carry HIV----->Negative-------> 0.000777

Does not Carry HIV----->Positive-------> 0.054834

Does not Carry HIV----->Negative------->0.686166

P (HIV | Positive) = P (HIV and positive) / P(positive)

= 0.258223 / 0.313057

= 0.8248

**Question 2:** According to a 2013 Gallup poll, worldwide only 13% of employees are engaged at work (psychologically committed to their jobs and likely to be making positive contributions to their organizations). Among a random sample of 10 employees, what is the probability that 8 of them are engaged at work?

**Ans**: n = 10

p = 0.13

1-p = 0.87

k = 8

**Question 4**: According to a 2014 Gallup poll, 56% of uninsured Americans who plan to get health insurance say they will do so through a government health insurance exchange. What is the probability that in a random sample of 10 people exactly 6 plan to get health insurance through a government health insurance exchange?

**Ans**: P(health insurance) = 0.56

P(6 of 10 through government health insurance) = 10C6 \* (0.56)6 \* (1 – 0.56)4

= 0.2427