SOC 4930/5050: PS-03 - Probability and Bayes' Theorem

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Directions

Complete all of the following questions. Your answers "by hand" should be scanned and submitted as a pdf *image. This assignment should be uploaded to your Assignments Repository by 4:15PM on Monday, September 25th, 2017.*

Part 1: Probabilities

Your social services program, which serves individuals with serious and persistent mental illness, has one-hundred clients currently. Of these clients, sixty-two have a history of trauma only and eighteen have a history of housing instability only. An additional twelve of the clients have a history of both trauma and housing instability.

1. Draw a venn diagram of this space.

2. What is the probability of a trauma history (either alone or with housing instability) in this client pool?

3. What is the compliment of the probability of a trauma history (either alone or with housing instability)?

4. What is the probability of having a history of housing instability without having a history of trauma?

5. What is the probability of trauma or housing instability occurring among these patients.

6. What is the conditional probability of a housing instability history given a trauma history.

7. What is the probability of having both a trauma history and a history of housing instability.

8. Are the probabilities of trauma and housing instability independent of each other?

Part 2: Bayes' Theorem

The main focus of your social services program is securing stable employment for your clients. Among all individuals with serious and persistent mental illness in your area of the country, the likelihood of finding a steady job is 33%. As part of this, they participate in a weekly group designed to increase the likelihood of find a steady job. Based on iterations of this group model used in other parts of the United States, you hypothesize that participating in the group increases the likelihood of finding a steady job to 78%. For about 10% of participants, however, the group intervention does not have an impact at all.

9. What is the prior probability (x) given in the scenario above?

10. What is the probability of the condition if the hypothesis is true (y)?

11. What is the probability of the condition if the hypothesis is false (z)?

12. Estimate the posterior probability of employment likelihood for participants.