

## Homework Assignment 2

Due by 5pm via Canvas, Thursday Feb 2nd

SDS 321 Intro to Probability and Statistics

1. A total of 50 percent of the voters in a certain city classify themselves as Independents, whereas 30 percent classify themselves as Liberals and 20 percent say that they are Conservatives. In a recent local election, 35 percent of the Independents, 60 percent of the Liberals, and 50 percent of the Conservatives voted. A voter is chosen at random. Given that this person voted in the local election, what is the probability that he or she is:
  - (a) (2 pts) What fraction of voters participated in the local election?
  - (b) (1 pts) an Independent?
  - (c) (1 pts) a Liberal?
  - (d) (1 pts) a Conservative?
2. Alice is taking a pregnancy test. On an average, about 60% of women taking a pregnancy test are actually pregnant. The false positive rate is 1.5 percent and the false negative rate is 1 percent.
  - (a) (2 pts) Alice takes the test and it comes out positive. Given this, what's the probability that Alice is pregnant?
  - (b) (4 pts) Alice takes the test again, and it comes out positive again. Given the results of the two tests what is the probability that she is pregnant?
  - (c) (4 pts) In the last question if Alice's second test comes out to be negative, then given results of the two tests (positive, negative) what is the probability that she is pregnant?
3. Independent flips of a coin that lands on heads with probability  $1/2$  are made. What is the probability that the first four outcomes are
  - (a) (1 pt)  $H, H, H, H$ ?
  - (b) (1 pt)  $T, H, H, H$ ?
  - (c) (3 pts) What is the probability that the pattern  $T, H, H, H$  occurs before the pattern  $H, H, H, H$ ?

Hint for part (c): How can the pattern  $H, H, H, H$  occur first?