STAT 451

Hand-in Homework 6

Due Monday, Oct. 26 by midnight. No late homework accepted as solutions will be posted shortly after the deadline because of the test on Wednesday. There is no grad problem on this assignment.

Solutions should be typed, not handwritten, and submitted as a single pdf file.

1. From Society of Obstetricians and Gynaecologists of Canada, "Prenatal Screening, Diagnosis, and Pregnancy Management of Fetal Neural Tube Defects", No. 314, October 2014. "Neural tube defect (NTD) prevalence ranges from 1 in 300 to 1 in 1000 pregnancies and is affected by ethnic, genetic, and dietary factors, with the highest NTD rates in the United Kingdom and the United States and the lowest rates in Japan. Second trimester maternal serum alpha fetoprotein (MSAFP) detects 71% to 90% of NTDs, with a false positive rate (FPR) of 1% to 3% percent." (FPR is the probability that someone without a disease tests positive; contrast that with specificity which is htm probability that someone without the disease tests negative).

   (a) For prevalence of 1 in 300, calculate PPV and NPV in the best case scenario (detects 90% of NTDs with FPR of 1%).

   (b) For prevalence of 1 in 300, calculate PPV and NPV in the worst case scenario (detects 71% of NTDs with FPR of 3%).

   In both cases, show how you arrived at your answers with either a tree diagram with appropriate values or a formula. Round final answers to 4 decimal places. Do not round intermediate calculations. For example, 1 in 300 is not .0033.

2. Part IV Review Exercises (pp. 469-474): R4.12, R4.14, R4.28.