

Philosophy 5311: Bayesian Epistemology  
Homework 1  
Due before class Wed, Sept 17th

Do the following problems from *Foundations of Bayesian Epistemology*

1.2, 2.5, 2.7, 3.3, 3.6

In addition, do the following two problems:

1) Assume that  $Pr$  is a probability function that satisfies the following:

$$P[E] = 0.55$$

$$P[F] = 0.5$$

$$P[\neg G] = 0.45$$

$$P[E \& F] = 0.3$$

$$P[E \& \neg G] = 0.25$$

$$P[F \& \neg G] = 0.3$$

$$P[E \& F \& \neg G] = 0.2$$

Find  $P[\neg E \& \neg F \& G]$ . Show your work in a way that makes it clear how you could have done a slightly different problem. For example, if you use a Venn diagram, tell me the order you filled in the regions and which regions correspond to the answer. If you use the algebraic method, just write the relevant equations, etc.).

2) Define the false positive rate of a test to be the probability of getting a positive result given that the patient does not have the disease. The false negative rate is the probability of getting a negative result given that they do have it.

You overhear a doctor tell her patient: "Now after the last set of tests, I told you I was 75% sure that you had the antibody in your blood so we decided to do another test. Well, now I can say that I am 95% sure. After all, the test came out positive and the false positive rate on this test is only 10%." Now you know that this doctor is a competent statistician. What can you infer about the false negative rate of the test? If the test had instead come out negative, how should the doctor have revised her beliefs?