STATISTICS HONORS - BAYES THEOREM PROBLEMS

1. Marie is getting married tomorrow, at an outdoor ceremony in the desert. In recent years, it has rained only 5 days each year. Unfortunately, the weatherman has predicted rain for tomorrow. When it actually rains, the weatherman correctly forecasts rain 90% of the time. When it doesn't rain, he incorrectly forecasts rain 10% of the time. What is the probability that it will rain on the day of Marie's wedding?

- Event A_1. It rains on Marie's wedding.
- Event A_2. It does not rain on Marie's wedding.
- Event B. The weatherman predicts rain. .
- The sample space is defined by two mutually-exclusive events - it rains or it does not rain. Additionally, a third event occurs when the weatherman predicts rain.

2. A manufacturer claims that its drug test will detect steroid use (that is, show positive for an athlete who uses steroids) 95% of the time. What the company does not tell you is that 15% of all steroid-free individuals also test positive (**the false positive** rate). 10% of professional baseball players use steroids.

E = the event that a player tests positive
F = the event that a player uses steroids

A-Rod of the New York Yankees has just tested positive. The probability that he uses steroids is?