Lab 5 Problem 3

3. Based on medical statistics, 10 out of every 1000 women have breast cancer. Of these 10 women, 9 test positive. Of the 990 without, 89 test positive anyways. A woman tests positive and wants to know what the chances she has cancer are.

Let C denote the event where a woman has breast Cancer

Let TP denote the event where a woman tests positive for breast Cancer

Let TN denote the event where a woman tests negative for breast Cancer

$P(C) = 0.01$

$P(TP|C) = 0.9$

$P(TP) = \dfrac{89+9}{1000} = 0.098$

$P(C|TP) = \dfrac{P(TP|C)\, P(C)}{P(TP)}$

$\Rightarrow P(C|TP) = \dfrac{0.9 \cdot 0.01}{0.098} = 0.091836$

$\Rightarrow$ The odds she has cancer given a positive test is around 9.2%

$\Rightarrow$ Out of 10 women w/ a positive Mammogram, about 1 has breast Cancer

(Answer choice 2)