A web site for home pregnancy tests cites the following: "When the subjects using the test were women who collected and tested their own samples, the overall sensitivity was 75%. Specificity was also low, in the range 52% to 75%." Assume the lower value for the specificity. Suppose a subject has a positive test and that 30% of women taking pregnancy tests are actually pregnant. What number is closest to the probability of pregnancy given the positive test?

$SENSITIVITY = P(+|D) = 0.75$

$SPECIFICITY = P(-|D^c) = 0.52$

$SUBJECT \rightarrow +$

$P(D) = 0.3$ PREVALENCE

$P(D|+) = ?$

USING BAYE'S RULE

$P(D|+) = \dfrac{P(+|D)P(D)}{P(+|D)P(D) + P(+|D^c)P(D^c)}$

$= \dfrac{P(+|D)P(D)}{P(+|D)P(D) + (1 - P(-|D^c))(1 - P(D))}$

$= \dfrac{0.75(0.3)}{0.75(0.3) + (1 - 0.52)(1 - 0.3)} = \dfrac{0.225}{0.561}$

$P(D|+) = 0.4011$

$\boxed{P(D|+) \approx 40\%}$