W203, Test 1, Question 3

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Q 3.2 Which machine

Bayes formula:

$$P(Y|M) = \frac{P(M|Y) * P(Y)}{P(M)}$$

Applying it to our case:

$$P(Y < 1|M = A) = \frac{P(M = A|Y < 1) * P(Y < 1)}{P(M = A)} \tag{1}$$

We know that $P(M = A) = 0.5$, from the sketch it is clear that $P(Y < 1|M = A) = 0.5$ and $P(Y < 1|M = B) = 0.25$. Given that,

$$P(Y < 1) = P(Y < 1|M = A) * P(M = A) + P(Y < 1|M = B) * P(M = B)$$

inputting real values:

$$P(Y < 1) = 0.5 * 0.5 + 0.25 * 0.5 = \frac{3}{8}$$

using result 1:

$$\frac{1}{2} = \frac{P(M = A|Y < 1) * \frac{3}{8}}{\frac{1}{2}}$$

$$P(M = A|Y < 1) = \frac{2}{3}$$