

1. (a) Blah.

$$6 * 6 * 6 = 216$$

- (b) There are 3 possible outcomes which you have to add together, a) you can have 3 3s(3C1) and the rest of the dice can't be 3 so 5 possibilities on each, b) 2 3s(3C2) and another dice with 5 possibilities, c) 3 3s(3C3).

$$\binom{3}{1} * 5^2 = 75$$

$$\binom{3}{2} * 5 = 15$$

$$\binom{3}{3} = 1$$

$$75 + 15 + 1 = 91$$

$$\frac{91}{216} = 0.4213$$

- (c) Included in screenshot

- (d) The only way to get 17 out of 3 dice is 6 6 5.
The 5 can be in 3 different places divided by 126 total combinations.

$$\frac{3}{216} = 0.0139$$

- (e) if 1 is first roll the combinations possible for a value of 12 is 1 5 6 or 1 6 5. The total combinations for last 2 dice is 6*6

$$\frac{2}{6^2} = 0.0556$$

2. (a) AAA.

$$\begin{aligned} & \left(\frac{1}{6} * \frac{1}{6}\right) + \left(\frac{5}{6} * \frac{1}{20}\right) \\ & \frac{1}{36} + \frac{1}{24} \\ & 0.0695 \end{aligned}$$

- (b) AA.

$$0 + \left(\frac{5}{6} * \frac{1}{20}\right) = 0.0417$$

3. Bayes

A = suspect is guilty

B = suspect has characteristics

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

$$\begin{aligned}
&= \frac{1 * 0.6}{P(B)} \\
&= \frac{0.6}{P(B|A)P(A) + P(B|A^c)P(A^c)} \\
&= \frac{0.6}{1 * 0.6 + 0.2 * 0.4} \\
&= \frac{0.6}{0.68} \\
&= 0.8823
\end{aligned}$$

4. Matlab.