Assignment 2

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Task 1

We have,
for **M** represents Maine and **S** represents Sahara,
$P(MorS) = 1$
$P(M) = 5\%$
$P(S) = 95\%$
$P(80 + |M) = 20\%$
$andP(80 + |S) = 90\%$

Part a

$$P(M|80-) = \frac{P(80 - |MP(M))}{P(80-)}$$

$$= \frac{P(80 - |MP(M))}{P(80 - |M)P(M) + P(80 - |S)P(S)}$$

$$= \frac{0.8 * 0.05}{0.05 * 0.8 + 0.1 * 0.95}$$

$$= \frac{0.04}{0.135}$$

$$= 0.296$$

Part b

Since we know the probability of a daily high for any day is conditionally independent of the daily high for the previous day, $P(M|80-)$ is still going to be 0.296 in the second day.
So, we can get $P(80-)$ as:

$$P(M|80-) = 29.6\% and P(S|80-) = 70.4\%$$

Here, we use the law of total probability,

$$P(80-) = P(80-|M) * P(M|80-) + P(80-|S) * P(S|80-)$$

$$P(80-) = 0.80 * 0.296 + 0.1 * 0.704$$

$$= 0.307$$

Part c

Since these are conditionally independent events, the chance of the event occurring third time too will be the same as the event occurring the second time or the first time which would be around 30.7%.

Task 2

For given sample S = A,B,C,D, it is given P(A) = 0.3 and P(B) = 0.6.
If 'P' here truly is probability function then P(C or D) should be 0.1 but we have no information that says P(C) and P(D) sum up to 0.1. Due to that lack of evidence, we cannot be completely certain that 'P' is a valid probability function but we can say it is possibly a probability function.

Task 3

We are given that probability for x when x is within the interval of 0 to 10 is 0.3. Since it describes probability of data in an interval, there is a very likely chance this is probability density. The statement says that, probability of finding **x** from 0 to 10 is 0.3 which describes the density of the element of **x**

Task 4

The code portion is done separately and is attached to this folder.