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Assignment 2

1. a)

$$P(x) = 5\% \quad P(5) = 95\%$$
$$P(T > 80 \mid M) = 20\% \quad P(T < 80 \mid M) = 80\%$$
$$P(T > 80 \mid S) = 90\% \quad P(T < 80 \mid S) = 10\%$$

$$P(M \mid T < 80) = \frac{P(M)P(T < 80 \mid M)}{P(T < 80)}$$

$$P(T < 80) = P(M)P(T < 80(M) + P(S)P(T < 80 \mid S)$$
$$P(M \mid T < 80) = \frac{P(M)P(T < 80 \mid M)}{[P(M)P(T < 80 \mid M) + P(S)P(T < 80 \mid S)]}$$
$$\frac{= .05 \times .8}{.05 \times .8 + .95 \times .1} = .2963$$
$$P(T) = .135$$
$$P(M \mid T < 80) = 29.63\%$$
$$P(S \mid T < 80) = 70.37\%$$

1. b)

$$T_{1,2} = T < 80 \quad (T_2 \text{ is coindependent})$$
$$P(T_2 \mid T_1) = P(T_2, M \mid T_1) + P(T_2, S \mid T_1)$$
$$\text{Apply } \rightarrow P(x, y) = P(x \mid y) * P(y)$$
$$= P(T_2 \mid M, T_1)P(M \mid T_1) + P(T_2 \mid S, T_1)P(S \mid T_1)$$
$$.30741 = P(T_2 \mid M)P(M \mid T_1) + P(T_2 \mid S)P(S \mid T_1)$$

I.c) $P(T_3 \wedge T_2 \wedge T_1) = .00246$

2. if $P(S) = P(A) + P(B) + P(L) + P(D) = 1$ then it would be a probability function, however it does not give US P(C) or P(D) therefor we can not determine if P. (S) equals to 1. Thus it is possibly a probability function.
3. It is possibly a probability function as it fufillsall conditions that I know of for the equation.

$$\int_0^{10} f(x)dx$$

4.

$$p(B = r) = .4$$
$$p(B = b) = .6$$
$$p(F = a \mid B = r) = .25$$
$$p(F = 0 \mid B = r) = .25$$
$$p(F = a \mid B = b) = .75$$
$$p(F = 0 \mid B = b) = .25$$
$$p(F_1 = a) = p(F_1 = a, B_1 = r) + p(F_1 = a, B_1 = b)$$
$$= p(F_1 = a \mid B_1 = r)p(B_1 = r) + p(F = a \mid B_1 = b)p(B = b)$$
$$= .55$$

$$p(F_1 = 0) = .45$$

$$p(B = r \mid F = a) = \frac{p(F = a \mid B = r)p(B = r)}{p(F = a)} = \frac{.75 * .6}{.55} = .1818$$
$$p(B = b \mid F = a) = .8181$$
$$p(B = r \mid F = 0) = \frac{p(F = 0 \mid B = r)p(B = r)}{p(F = 0)} = \frac{.75 * .6}{.45} = .6667$$
$$p(B = b \mid F = 0) = .3333$$

Depending on the classifiers of $\boldsymbol{x}$, if it is orange than it will give the corset out put 66.67% it it is apple then it is 81.81%