Exercise 2

$P(F=T, C=F, W=F)$

For joint probabilities, use chain rule:

$P(F=T, C=F, W=F) = P(F=T, I, C=F, W=F)$

$= \sum_i \{ P(W=F) \times P(I=i \mid W=F) \times P(C=F \mid W=F) \times P(F=T \mid I=i, C=F) \}$

① ② ③ ④

I=i	1	2	3	4	Π
0	0.5	0.5	0.8	0.0	0
1	0.5	0.5	0.8	0.9	0.18
					0.18 → sum of all

0.1800 or 18.00% probability when Fever is true and Cold/Winter are false with Influenza unknown

$P(F=F, C=F, W=F)$

For joint probabilities, use chain rule:

$P(F=F, C=F, W=F) = P(F=F, I, C=F, W=F)$

$= \sum_i \{ P(W=F) \times P(I=i \mid W=F) \times P(C=F \mid W=F) \times P(F=F \mid I=i, C=F) \}$

① ② ③ ④

I=i	1	2	3	4	Π
0	0.5	0.5	0.8	1.0	0.2
1	0.5	0.5	0.8	0.1	0.02
					0.22 → sum of all

0.2200 or 22.00% probability when Fever/Cold/Winter are false with Influenza unknown

$P(F=T, C=F, W=T)$

For joint probabilities, use chain rule:

$P(F=T, C=F, W=T) = P(F=T, I, C=F, W=T)$

$= \sum_i \{ P(W=T) \times P(I=i \mid W=T) \times P(C=F \mid W=T) \times P(F=T \mid I=i, C=F) \}$

① ② ③ ④

I=i	1	2	3	4	Π
0	0.5	0.9	0.2	0	0
1	0.5	0.1	0.2	0.9	0.009
					0.009 → sum of all

using code CPT

0.0090000 or 0.9000% probability when Fever/Winter are true and Cold is false with Influenza unknown