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CS 344 - Lab 5

Exercise 5.2

a.) $\mathbb{P}(Cancer \mid Test1 \wedge Test2) = \alpha \sum P(Cancer, Test1, Test2)$

$= \alpha \sum P(Cancer) \cdot P(Test1 \mid Cancer) \cdot P(Test2 \mid Cancer)$

$= \alpha \langle (0.01 \cdot 0.9 \cdot 0.9), (0.99 \cdot 0.2 \cdot 0.2) \rangle$ (C, ¬C)

$= \alpha \langle \underset{0.0477}{0.0081}, \underset{0.0477}{0.0396} \rangle$

$\approx \langle 0.17, 0.83 \rangle$

.0396
+ .0081
.0477

b.) $\mathbb{P}(Cancer \mid Test1 \wedge \neg Test2) = \alpha \sum P(Cancer, Test1, \neg Test2)$

$= \alpha \sum P(Cancer) \cdot P(Test1 \mid Cancer) \cdot P(\neg Test2 \mid Cancer)$

$= \alpha \langle (0.01 \cdot 0.9 \cdot 0.1), (0.99 \cdot 0.2 \cdot 0.8) \rangle$

$= \alpha \langle \underset{0.1593}{0.0009}, \underset{0.1593}{0.1584} \rangle$

$\approx \langle 0.00565, 0.99435 \rangle$

Exercise 5.3

a.i.) $\mathbb{P}(Raise \mid Sunny) = \mathbb{P}(Raise) = \langle 0.01, 0.99 \rangle$

a.ii.) $\mathbb{P}(Raise \mid Happy \wedge Sunny) = \alpha \sum P(Raise, Happy, Sunny)$

$= \alpha \sum P(Raise) \cdot P(Happy \wedge Sunny \mid Raise)$

$= \alpha \langle (0.01 \cdot 1.0), (0.99 \cdot 0.7) \rangle$

$= \alpha \langle \underset{0.703}{0.01}, \underset{0.703}{0.693} \rangle$

$\approx \langle 0.0142, 0.98578 \rangle$