

1. $P(B_1) = 1/2, P(B_2) = 1/4, P(B_3) = 1/8,$ and $P(B_4) = 1/8.$

(a) $P(W) = P(W \cap B_1) + P(W \cap B_2) + P(W \cap B_3) + P(W \cap B_4).$ Next, use the conditional probability formula. $P(W) = P(W|B_1)P(B_1) + P(W|B_2)P(B_2) + P(W|B_3)P(B_3) + P(W|B_4)P(B_4).$ We can calculate each of these terms. $P(W) = 1 * 1/2 + 0 * 1/4 + 1/2 * 1/8 + 3/4 * 1/8 = 21/32 \approx 0.66.$

(b) $P(B_1|W) = P(W|B_1)P(B_1)/P(W) = \frac{1/2}{21/32} = 16/21 \approx 0.76$

2. $P(G|A) = .85, P(G|B) = 0.75.$ Further, $P(A) = 0.4$ and $P(B) = 0.6.$

(a) $P(G) = P(G|A)P(A) + P(G|B)P(B) = 0.85 * .4 + 0.75 * 0.6 = 0.79$

(b) $P(A|G) = P(G|A)P(A)/P(G) = \frac{0.85*.4}{0.79} \approx .43$

3. $P(SP) = 0.6, P(D|SP) = 0.01, P(PP) = 0.3, P(D|PP) = 0.008,$ and $P(UP) = 0.1, P(D|UP) = 0.007.$ Therefore, $P(D) = 0.6 * .01 + 0.3 * 0.008 + 0.1 * 0.007 = 0.0091$

• $P(SP|D) = \frac{0.6*0.01}{0.0091} \approx .66$

• $P(PP|D) = \frac{0.3*0.008}{0.0091} \approx .26$

• $P(UP|D) = \frac{0.1*0.007}{0.0091} \approx .08$