Details of the wumpus world calculations

$\mathbb{P}(P_{1,3}|$ known, b$) = \alpha' \, \mathbb{P}(P_{1,3}) \sum_{frontier} \mathbb{P}($ b $|$ known, $P_{1,3}$, frontier$)$ P(frontier)

First, compute with $P_{1,3}$ = true:

Compute the sum over the frontier:

P(b | known, $P_{1,3}$, $P_{2,2}$, $P_{3,1}$) P($P_{2,2}$, $P_{3,1}$) = $1 \times 0.2 \times 0.2$
= 0.04
P(b | known, $P_{1,3}$, $\neg P_{2,2}$, $P_{3,1}$) P($\neg P_{2,2}$, $P_{3,1}$) = $1 \times 0.8 \times 0.2$
= 0.16
P(b | known, $P_{1,3}$, $P_{2,2}$, $\neg P_{3,1}$) P($P_{2,2}$, $\neg P_{3,1}$) = $1 \times 0.2 \times 0.8$
= 0.16
P(b | known, $P_{1,3}$, $\neg P_{2,2}$, $\neg P_{3,1}$) P($\neg P_{2,2}$, $\neg P_{3,1}$) = $0 \times 0.8 \times 0.8$
= 0.00

The sum is: 0.04 + 0.16 + 0.16 + 0.00 = 0.36

P($P_{1,3}$) = 0.2, therefore:

P($P_{1,3}$) $\sum_{frontier}$ P(b | known, $P_{1,3}$, frontier) P(frontier) = $0.2 \times 0.36 = 0.072$

Then, compute with $P_{1,3}$ = false:

Compute the sum over the frontier:

P(b | known, $\neg P_{1,3}$, $P_{2,2}$, $P_{3,1}$) P($P_{2,2}$, $P_{3,1}$) = $1 \times 0.2 \times 0.2$
= 0.04
P(b | known, $\neg P_{1,3}$, $\neg P_{2,2}$, $P_{3,1}$) P($\neg P_{2,2}$, $P_{3,1}$) = $0 \times 0.8 \times 0.2$
= 0.00
P(b | known, $\neg P_{1,3}$, $P_{2,2}$, $\neg P_{3,1}$) P($P_{2,2}$, $\neg P_{3,1}$) = $1 \times 0.2 \times 0.8$
= 0.16
P(b | known, $\neg P_{1,3}$, $\neg P_{2,2}$, $\neg P_{3,1}$) P($\neg P_{2,2}$, $\neg P_{3,1}$) = $0 \times 0.8 \times 0.8$
= 0.00

The sum is: 0.04 + 0.00 + 0.16 + 0.00 = 0.20

P($\neg P_{1,3}$) = 0.8, therefore:

P($P_{1,3}$) $\sum_{frontier}$ P(b | known, $P_{1,3}$, frontier) P(frontier) = $0.8 \times 0.20 = 0.16$

$\mathbb{P}(P_{1,3}|$ known, b$) = \alpha' < 0.072, 0.16 > = < \frac{0.072}{0.072+0.16} , \frac{0.16}{0.072+0.16} > = < 0.31, 0.69 >$

P($P_{1,3}$| known, b) = 0.31 (= P($P_{3,1}$| known, b) by symmetry)