4.6 Bayes' Theorem

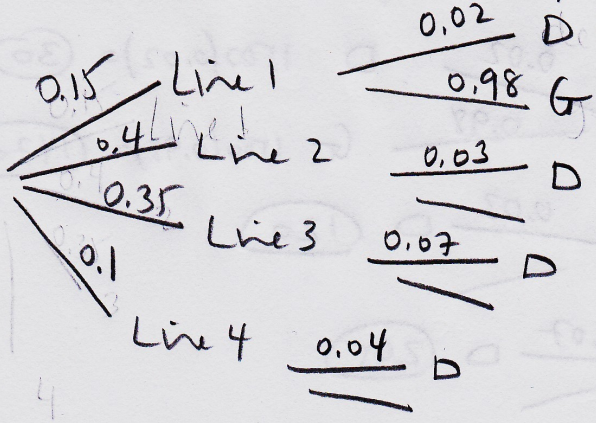
(Continuation of Section 4.5)

Ex: A factory has 4 production lines. Line 1 produces 15% of all items; 2% of the items it produces are defective.

Line	% of all items produced	% defective
1	15	2
2	40	3
3	35	7
4	10	4

Pr(a defective item was produced on Line 3)?

D = defective
G = good



Want Pr(Line 3 | D)

$$\Pr(\text{Line } 3 \mid D)$$

$$= \frac{\Pr(\text{Line } 3 \wedge D)}{\Pr(D)}$$

Multiply along each path

Sum all paths to get $\Pr(D)$

$$= \frac{0.35(0.07)}{[0.15(0.02) + 0.4(0.03) + 0.35(0.07) + 0.1(0.04)]}$$

$$\approx 0.56$$

This process is called "Bayes' Theorem"