

BAYES FORMULA

If $P(A|B)$ is known, can we find $P(B|A)$?

Example: In a certain factory, the probability that an employee produces a defective item is as follows:

- .05 for senior employees S D = defective
- .10 for Junior " J D' = non D
- .20 for Freshmen " F

60% are seniors, 30% are Juniors, 10% are Freshmen

[If a defective item is produced, what is the probability it came from a Junior employee?]

$$P(S) = .60$$

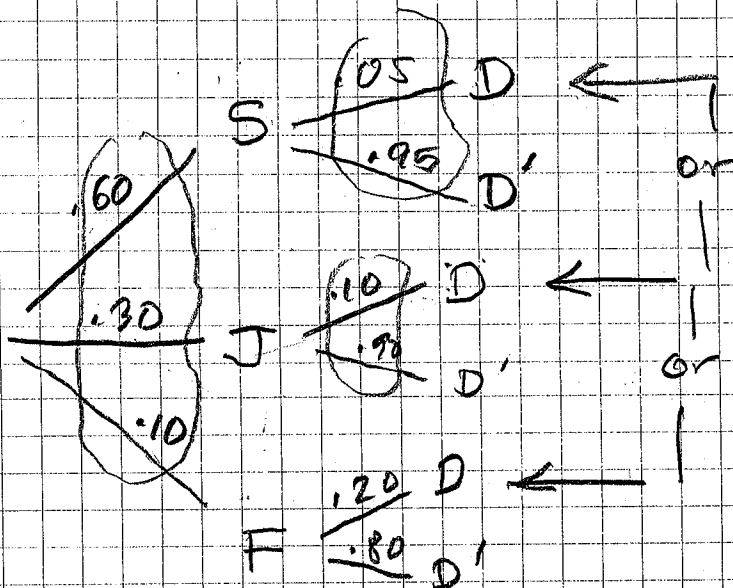
$$P(J) = .30$$

$$P(F) = .10$$

$$P(D|S) = .05$$

$$P(D'|J) = .10$$

$$P(D|F) = .20$$



$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

Question:

$$P(J|D) = \frac{P(J \cap D)}{P(D)} =$$

$$= \frac{.30 * .10}{.60 * .05 + .30 * .10 + .10 * .20} = .375$$