BAYES THEOREM

ALLOWS US TO CONVERT $P[A|B]$ TO $P[B|A]$
IF WE KNOW $P[A]$ & $P[B]$

$$P[D|F] = \frac{P[F|D] \cdot P[D]}{P[F]}$$

WHAT'S THE PROBABILITY THAT A PROGRAM
THAT COMPILES THE FIRST WAS WRITTEN BY DREN (D)

DISEASE SCREENING PROBLEM
CONSIDER SCREENING FOR A DISEASE VIA TESTING
PEOPLE EITHER HAVE THE DISEASE (D) OR NOT (D^c)
THEY CAN EITHER TEST POSITIVE (T_P) OR NEGATIVE (T_N)
HERE ARE THE CHARACTERISTICS OF THE TESTS TO RADAR DETECTION

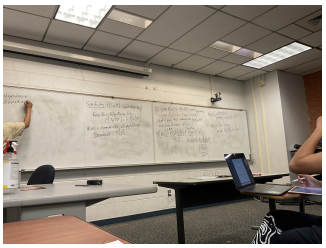
SENSITIVITY PROB OF DETECTION $P[T_P|D]$ WAS CLOSE TO 1

SPECIFICITY $P[T_N|D^c]$ WAS CLOSE TO 1

FALSE POSITIVE PROBABILITY
$P[T_P|D^c] = 1 - P[T_N|D^c]$

PREVELANCE $P[D]$
ALSO A CHARACTERISTIC OF POPULATION

QUESTION WITH $P[T_P|D] =$



INDEPENDENCE

2 EVENTS ARE INDEP. IF OBSERVING ONE DOES NOT AFFECT THE PROB OF OTHER.

(1) DEFN

A & B ARE INDEP. $\overset{IFF}{\Longleftrightarrow}$ $P[AB] = P[A] \cdot P[B]$

RELATED RELATIONSHIPS IF A & B ARE INDEPENDENT

$P[A|B] = P[A]$ & $P[B|A] = P[B]$

SOME SIMILARITY INFORM TO A & B BEING MUTUALLY EXCLUSIVE

M.E. $\Rightarrow P[A \cup B] = P[A] \cup P[B]$

QUIZ 1.3 A STUDENT TEST SCORE T IS AN INTEGER BETWEEN 0 & 100

CORRESPONDING TO THE EXPERIMENTAL OUTCOMES $S_0, \ldots, S_{100}$

A SCORE OF 90 TO 100 IS AN A

80 TO 89 IS A B

70 TO 79 IS A C

60 TO 69 IS A D

0 TO 60 IS A F

IF ALL SCORES BETWEEN 51 AND 100 ARE EQUALLY LIKELY

AND SCORES BETWEEN A SCORE OF 50 OR LESS NEVER OCCURS

FIND THE FOLLOWING.

THERE ARE 50 EQUALLY LIKELY OUTCOMES: S_{51} THROUGH S_{100}

EACH OUTCOME HAS THE PROBABILITY 1/50

$P[\{S_{100}\}] = 1/50 = 0.02$

$P[A] = P[\{S_{90}, \ldots, S_{100}\}] = 11/50 = 0.22$

$P[F] = P[\{S_{51}, \ldots, S_{59}\}] = 9/50$

$P[T < 90] = P[\{S_{51}, \ldots, S_{89}\}] = 39/50$

$P[\text{C OR BETTER}] = P[\{S_{70}, \ldots, S_{100}\}] = 31/50$

$P[\text{STUDENT PASSES}] = P[\{S_{60}, \ldots, S_{100}\}] = 41/50$

THERE ARE 50 EQUALLY LIKELY OUTCOMES

$P[S_{100}] = 1/50$

$P[A] = 9/50$