# SI PAL – Session #3

## Basic and Conditional Probabilities

| | Minor Fracture | Severe Fracture | Minor Joint | Severe Joint | Total |
|---|---|---|---|---|---|
| Male Athlete | 147 | 52 | 74 | 291 | |
| Male Non-Athlete | 141 | 38 | 39 | 372 | |
| Female Athlete | 72 | 12 | 29 | 102 | |
| Female Non-Athlete | 183 | 30 | 8 | 117 | |
| Total | | | | | |

1. P (The person is a Male Athlete)

2. P (The person is a Male)

3. P (Female Athlete ∩ Minor Joint)

4. P (Male Non-Athlete ∪ Severe Fracture)

5. P (Female Non-Athlete ∩ Severe Joint)

6. P (Male Athlete | Severe Fracture)

7. P (Minor Fracture | Female Non-Athlete

8. P (Male Non-Athlete | Minor Joint)

9. P (Male Athlete ∪ Male Non-Athlete | Severe Joint )

10. P (Male | Joint)

# Baye's Problem

## Example 1

a) Fill in the table using the information below

- Suppose that a known disease occurs in 2% of the population
- The medical test produces a positive reading on 99.5% of those infected with the disease
- Suppose that this test gives a positive result in healthy patients 2% of the time
- Assume we have 100,000 random individuals who follow the above information perfectly
-

| | Has Disease | Does Not Have Disease | Total |
|---|---|---|---|
| Test Positive | | | |
| Test Negative | | | |
| Total | | | 100,000 |

b) Determine P (Have the Disease | Tested Positive)

c) Determine P (Have the Disease | Tested Negative)

**Example 2**

Two dice (one red and one green) are to be rolled. The sample space consists of the 36 outcomes listed below. The first number is what is rolled on the Red die and the second number is what is rolled on the Green. Determine:

$$S = \begin{Bmatrix} 1,1 & 1,2 & 1,3 & 1,4 & 1,5 & 1,6 \\ 2,1 & 2,2 & 2,3 & 2,4 & 2,5 & 2,6 \\ 3,1 & 3,2 & 3,3, & 3,4 & 3,5 & 3,6 \\ 4,1 & 4,2 & 4,3 & 4,4 & 4,5 & 4,6 \\ 5,1 & 5,2 & 5,3 & 5,4 & 5,5 & 5,6 \\ 6,1 & 6,2 & 6,3 & 6,4 & 6,5 & 6,6 \end{Bmatrix}$$

a)    P(At least one of the dice is a 5)

b)    P(Sum of the dice is equal to 7)

c) P(Sum of the dice is 11 or more)

d) P(Both are less than 3)

e) P(Red is larger than Green)

f) P(Sum is greater than 9)

g) P(Red = 6)

h) P(Largest number is a 5)

i) P(Smallest number is a 5)

<u>**Example 2**</u>

A deck of cards is shuffled and a card is drawn. Determine each of the following probabilities.
a) The probability that a face card is selected.         b) The probability that the card is not
a 7.
c) The probability that the card is a Club.         d) The probability that a Red face is
selected.
e) The probability that the card is Red or a King.        f) The card is red or a Club.
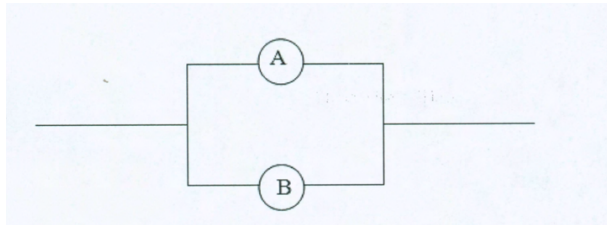


<u>**Circuit Problems**</u>

Determine the probability that the circuit works given that the component works probability is given bellow.

1.  P(A) = 0.84    P(B) = 0.62

2.  P(A) = 0.91    P(B) = 0.98

3.  P(A) = 0.99    P(B) = 0.84

4.  P(A) = 0.65    P(B) = 0.98