Question 01

Heart disease and stroke, as estimated by the Centers for Disease Control and Prevention (CDC), costs the the United States healthcare system more than 214 Billion dollars every year. These diseases together are also responsible for an estimated 868,000 Americans deaths annually.

If you and a friend had two different, subjective, estimates of the probability that this year those burdens would increase—say you assigned a probability of 70% to an increase and your friend an 85% probability—would these types of subjective estimates align with our Frequentist definition of probability? Why or Why not?

Question 02

Given the following sets:

$$A = \{1, 2, 3, 10, 0.1\}$$
$$B = \{a, b, d, e, f, 10, 1, 3\}$$

(A)

Compute $A \cap B$

(B)

Compute $A \cup B$

(C)

Compute $A \cup \emptyset$

(D)

Compute $A \cap \emptyset$

A set X is a subset of a second set Y if every item (element) in X is also in Y. We write $X \subset Y$ to denote that X is a subset of Y. In mathematical notation we can say X is a subset of Y if

$$x \in Y \text{ whenever } x \in X \tag{1}$$

(E)

For the set $Y = \{1, 15, 30, 45, 60, 75\}$, please create a subset.

(F)

Two sets, X and Y, are **equal** ($X = Y$) if every item in Y is in X and every item in X is in Y. In your own words, show that $X = Y$ if $X \subset Y$ and $Y \subset X$

(G)

If $X \subset Y$ how would the probability of the event X, $p(X)$, relate to the probability of the event Y $p(Y)$?

Question 03

(A)

A universal set of all possible future outcomes of an experiment is called?

(B)

For any event A, what is $p(A \cup A^c)$?

(C)

Are the events A and A^c disjoint? Why or why not?

(D)

Show, for an event A, $p(A) = 1 - p(A^c)$

Question 04

(A)

Suppose we analyzed the results of a clinical trial and wanted to estimate a probability distribution of the number of serious adverse events that occurred. Is the below a feasible probability distribution to describe a patient's potential number of SAEs? Why or Why not?

Number of SAEs	Probability
0	0.1
1	0.15
2	0.15
3	0.05
4	0.05
5	0.1
6	0.3
7	0.05
>8	0.08