ASSIGNMENT 1

Numbers have been used as a mathematical tool to count, measure or label in almost every noted civilizations and cultures. While Egyptians and Greeks were the first to use a numeral system and map it onto alphabets, with Roman numerals system that mapped roman letters with numbers later on becoming a widely used system in Europe, it was the use of zero, which was developed by Indian mathematicians in 6th-7th century that eventually became a key aspect of the widespread use of Hindu-Arabic numeral system which eventually became the most common system for representing numbers at present.

Indian mathematician Brahmagupta is credited with the first use and formulation of zero in one of his books, *“Brāhmasphuṭasiddhānta”* which became the earliest known pieces of work to treat zero as a number. The book also stipulated the rules to use zero with positive and negative numbers, which led the book to be regarded as a complete documentation of zero and from which, other civilizations and cultures introduced zero into their own numeral systems. Even long before the invention and use of zero, numbers had a huge significance in ancient India where in the early Vedic period which was between 1200 and 600 BC, geometry, arithmetic, and a decimal numerical system was already in place which was largely influenced by religion.

Numbers were eventually used for variety of mathematical concepts including probability and statistics. Probability is a concept that deals with the likelihood of an event, represented by numbers between 0 and 1. Probability is considered as a fairly modern concept in mathematics; however, the concept has been in use in different civilizations through the early stages of the creation of dice in games, from ancient Greek pottery to ancient Egyptian board games where dice was used which eventually became an important tool to study the concept of probability from 16th century onwards. Blaise Pascal, Pierre de Fermat, and Gerolamo Cardano were the mathematicians that introduced and established the foundation of modern theory of probability based on gambling disputes in 17th century. From then on, there were variety of refinements made to the concept of probability, starting with Christian Huygens who was a Dutch scientist that published the first book on probability *“De Ratiociniis in Ludo Aleae”* which was in correspondence with the contributions of Pascal and Fermat, followed by Pierre de Laplace who in his book *“Théorie Analytique des Probabilités”,* applied the concept of probability to various practical and scientific problems in early 19th century. Finally, in early 20th century, Russian mathematician A.Kolmogorov arrived at an axiomatic approach to the theory of probability that can be used in mathematics. Probability eventually laid the foundation to another mathematical concept, statistics.

Statistics is a mathematical concept that dealt with how data is collected, organized, analyzed, interpreted, and presented. The earliest known use of statistical inferences dates back to 8th century where Arab mathematicians like Al-Khalil wrote the Book of Cryptographic Messages which highlighted the earlies known use of permutation and combinations followed by the important contributions of Al-Kindi who made use of frequency analysis to decipher encrypted messages and Ibn-Adlan with his important contribution on the use of sample size in frequency analysis. The modern take on statistics began in the 18th century, however it picked pace and its use disseminated into different fields from early 20th century. Karl Pearson initially transformed statistics as a mathematical discipline which can be used for analysis in academia, industry, and politics. Ronald Fischer then contributed by designing better experimental models and techniques that can be used for the analysis of small data samples. Finally, Karl Pearson’s son Egon Pearson with Jerzy Neyman helped in expanding and refining the early works on statistics by introducing modern refined versions of confidence interval, statistical hypothesis testing and null hypothesis.