Assignment 15

A Gaussian distribution is defined by its mean, μ, and standard deviation, σ. The probability density function is given by:

\[ f(x) = \frac{1}{\sigma \sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} \]

(a) For a Gaussian distribution with mean 0 and standard deviation 1 (standard normal distribution), calculate the following probabilities:

(i) What is the probability that a random variable is between -1 and 1?

(ii) What is the probability that a random variable is between -2 and 2?

(iii) What is the probability that a random variable is between -3 and 3?

(b) The distribution of heights of adult males in the US is approximately normal with mean 70 inches and standard deviation 3 inches. Use the cumulative distribution function (CDF) of the standard normal distribution to find the probability that a randomly selected adult male is:

(i) Shorter than 68 inches

(ii) Between 67 and 73 inches

(iii) Taller than 75 inches

(c) The distribution of IQ scores in the general population is approximately normal with mean 100 and standard deviation 15. Use the CDF of the standard normal distribution to find the probability that a randomly selected individual has an IQ score of:

(i) Less than 85

(ii) Between 80 and 110

(iii) Greater than 120

(d) The distribution of test scores in a class is approximately normal with mean 85 and standard deviation 10. Use the CDF of the standard normal distribution to find the probability that a randomly selected student scored:

(i) Below 75

(ii) Between 75 and 95

(iii) Above 100

(e) The distribution of weights of newborn babies is approximately normal with mean 3.5 pounds and standard deviation 0.5 pounds. Use the CDF of the standard normal distribution to find the probability that a randomly selected newborn baby weighs:

(i) Less than 3 pounds

(ii) Between 3 and 4 pounds

(iii) More than 4 pounds