S3.1 – Continuous random variables

Presenter example worked solution

Suppose you choose a real number X from the interval or with a Probability Density Function

* Find 𝐶 and hence state the function .
* Find
* Find the mode of the distribution.

This is the value corresponding the maximum value of the probability density function.

This can be observed to be 5 from a graph of f(x).

Check is a maximum turning point.

is a maximum turning point and is the mode of the distribution.

Note: Ensure any maximum turning point is within the domain of the functions and consider the endpoints that the function is defined.

* Find the mean or expected value of .

𝐸

Note: This equals the median and mode because the distribution is symmetrical over the domain.

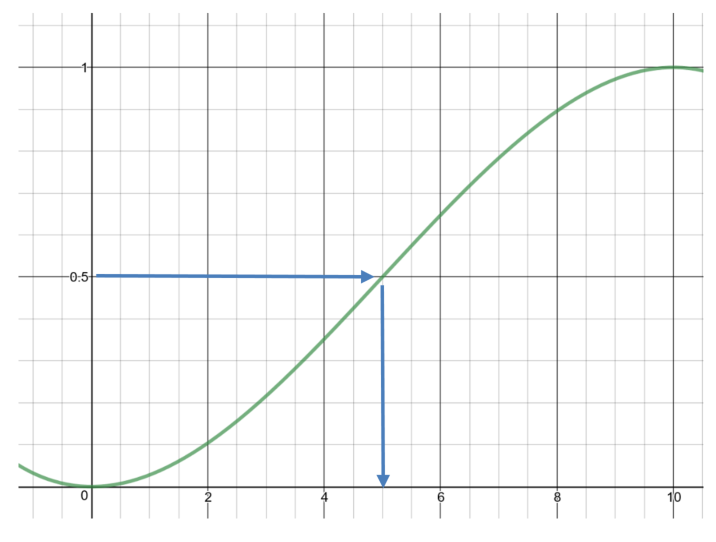
* Find and hence the standard deviation.

, 𝐸

* Find the median of the distribution.

Method 1: From the cumulative distribution function (CDF):

Graph of the cumulative distribution function:



Median = 5

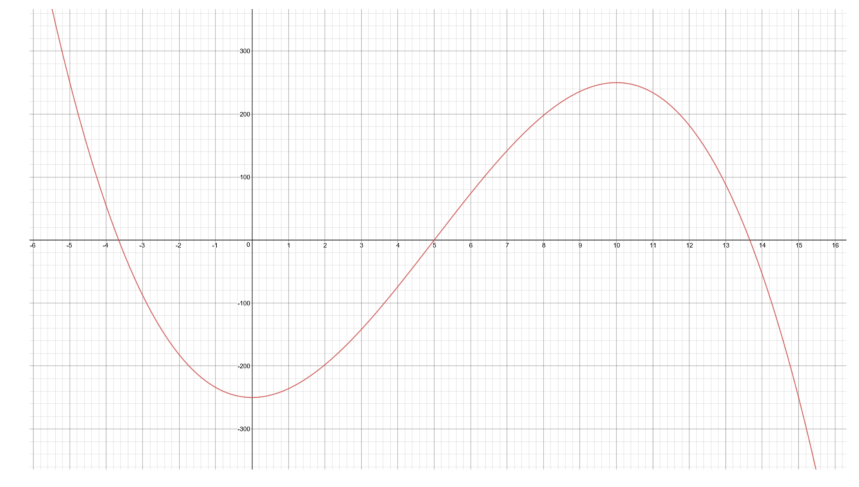
Method 2: By integration

The value where the area under the curve from the lower bound is equal to 0.5.

Solve

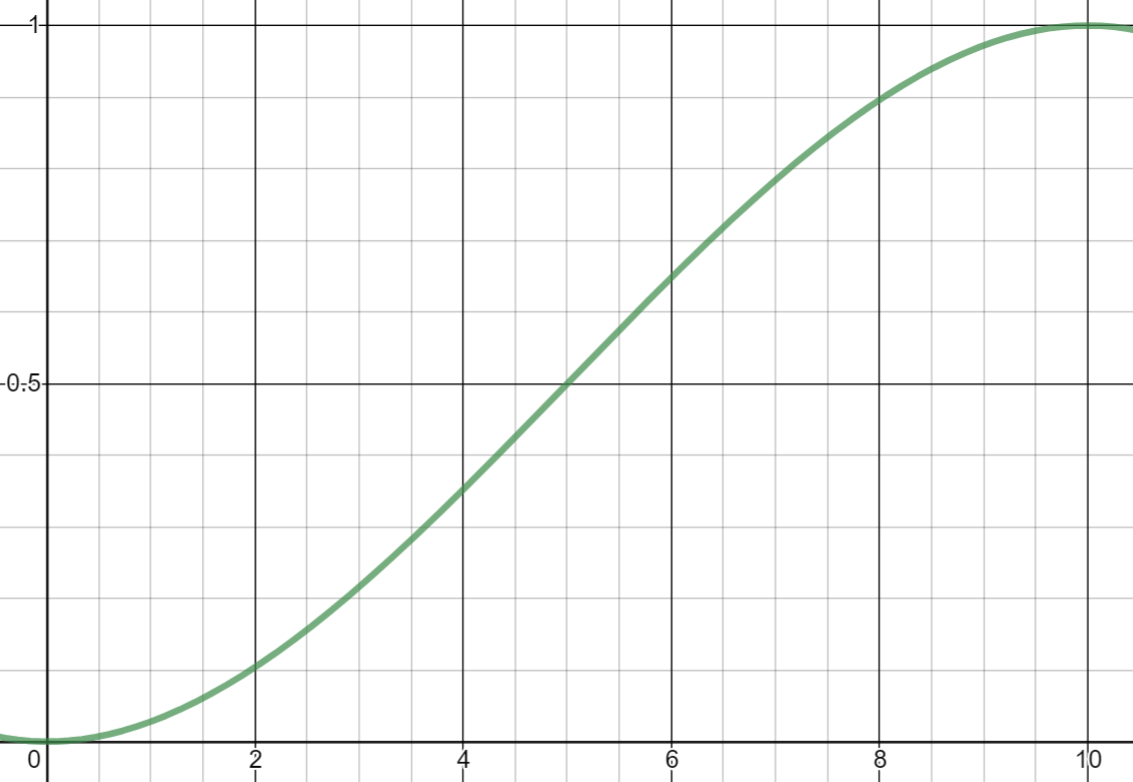
Median = 5

This can also be observed from the graph of , where



* Find the 10th percentile of the distribution

Method 1: From the cumulative distribution function:



10th percentile is approximately 2.

Method 2: By integration

Solve

This can also be observed from the graph of , where

