Question 9.3.7

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There are 5% defective items in a large bulk of items. What is the probability that a sample of 10 items will include not more than one defective item?
Solution:

Parameter	Values	Description
n	10	Number of items
p	0.05	Probability of being defective

Table 1: Definition of parameters.

Mean is given by

$$\mu = np \tag{1}$$
$$= 0.5 \tag{2}$$

Standard Deviation is given by

$$\sigma = \sqrt{np(1-p)} \tag{3}$$
$$= \sqrt{10 \times 0.05 \times (1-0.05)} \tag{4}$$
$$= 0.689 \tag{5}$$

We need to find

$$\Pr(X \leq 1) = \Pr(X < 1.5) \tag{6}$$

We have,

$$Z = \frac{X - \mu}{\sigma} \tag{7}$$
$$= 1.451 \tag{8}$$

Hence, from standard distribution table of Z, we have

$$\Pr(Z \leq 1.451) = 0.9265 \tag{9}$$
$$= 92.65\% \tag{10}$$

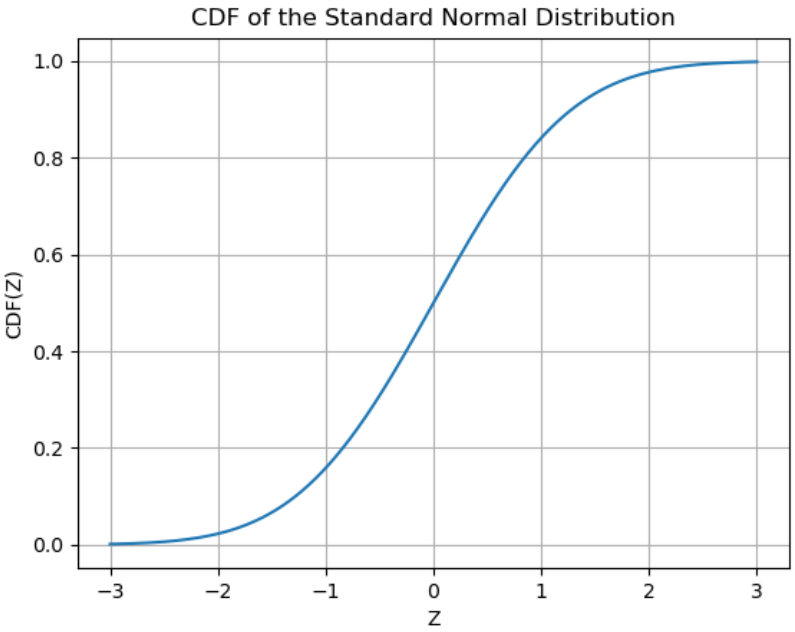

Figure 1: CDF of Z