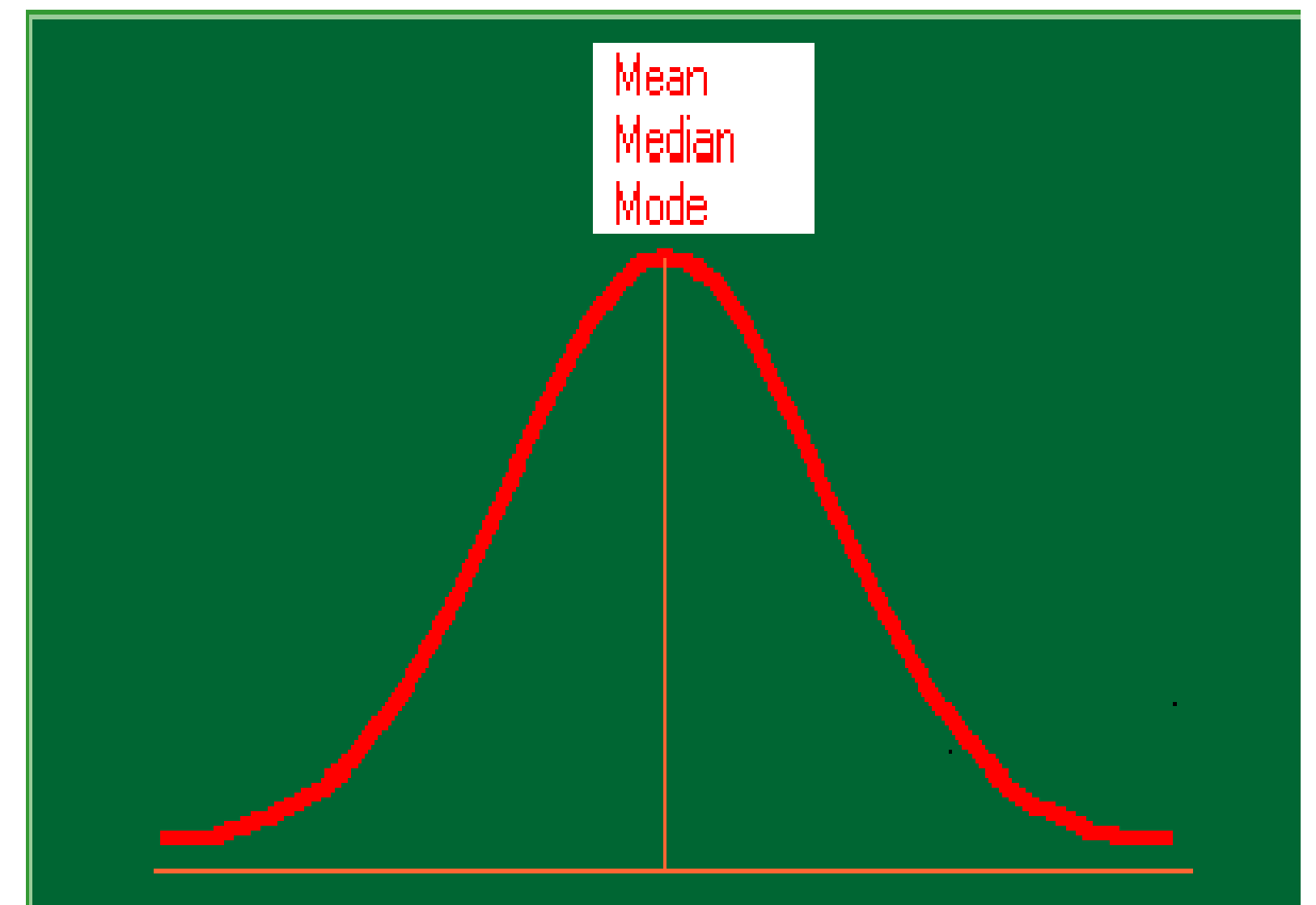


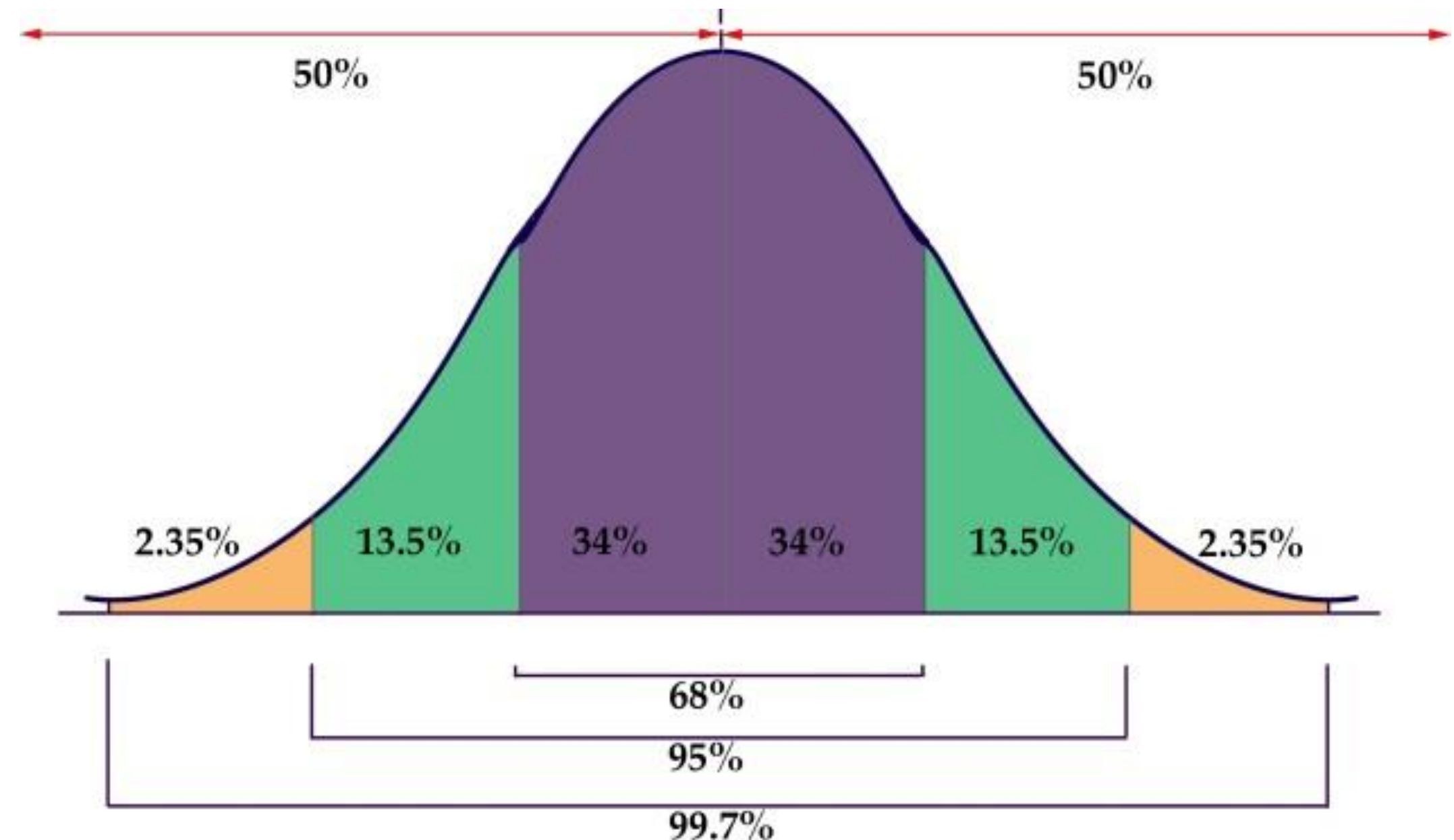
NORMAL DISTRIBUTION

- ❖ The normal distribution is a continuous distribution looking like a bell.
- ❖ Statisticians use the expression “Bell Shaped Distribution”.
- ❖ It is a beautiful distribution in which the mean, the median, and the mode are all equal to one another.
- ❖ It is symmetrical about its mean.
- ❖ If the tails of the normal distribution are extended, they will run parallel to the horizontal axis without actually touching it. (asymptotic to the x-axis)
- ❖ The normal distribution has two parameters namely the mean μ and the standard deviation σ



Empirical Rule

- ❖ The empirical rule approximates the variation of data in the bell-shaped distribution.
- ❖ Approximately 68% of the data in a bell shaped distribution is within 1 standard deviation of the mean or $\mu \pm 1\sigma$
- ❖ Approximately 95% of the data is a bell-shaped distribution lies within two standard deviations of the mean, or $\mu \pm 2\sigma$
- ❖ Approximately 99.7% of the data is a bell-shaped distribution lies within three standard deviations of the mean, or $\mu \pm 3\sigma$

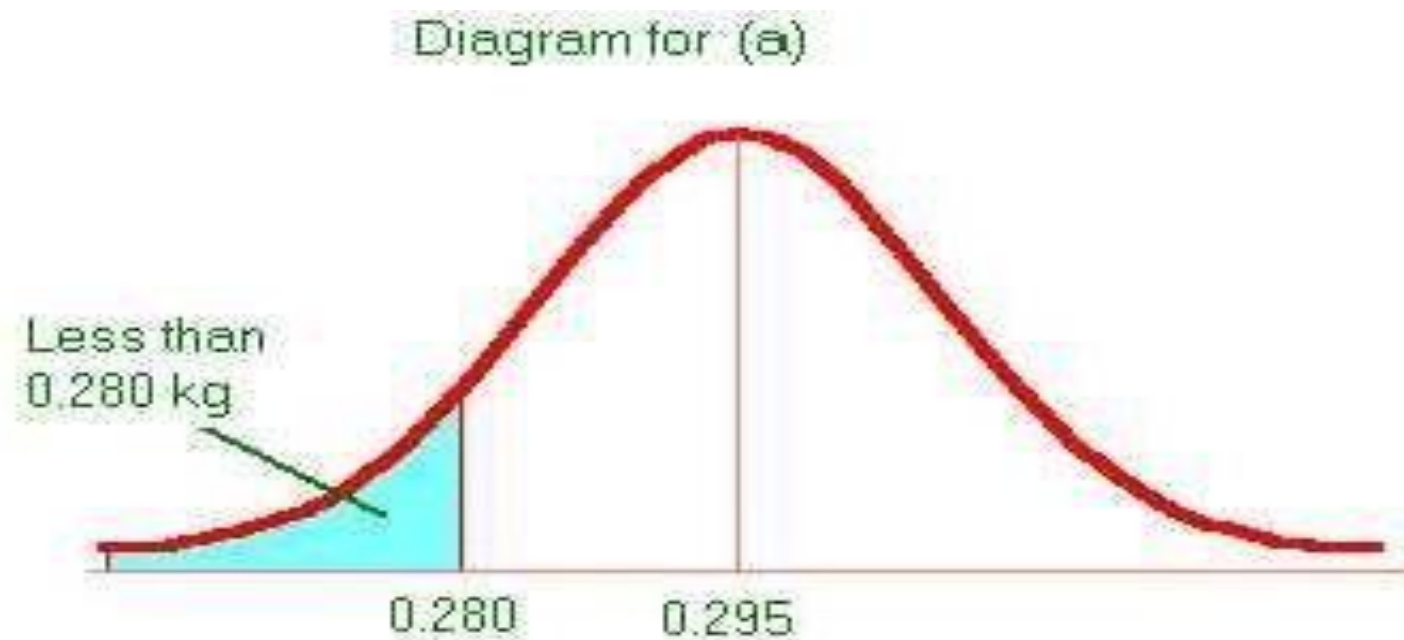


Case Study-2

The mean weight of a morning breakfast cereal pack is 0.295 kg with a standard deviation of 0.025 kg. The random variable weight of the pack follows a normal distribution.

- a) What is the probability that the pack weighs less than 0.280 kg?
- b) What is the probability that the pack weighs more than 0.350 kg?
- c) The sales team is negotiating with a new customer who has more stringent quality requirements. The new customer requires packs which should be between 0.260 and 0.340 kg. What is the probability that a pack produced by the current process will be acceptable to the new customer?
- d) What is the weight for which 99% of the packs produced will be less than the weight?

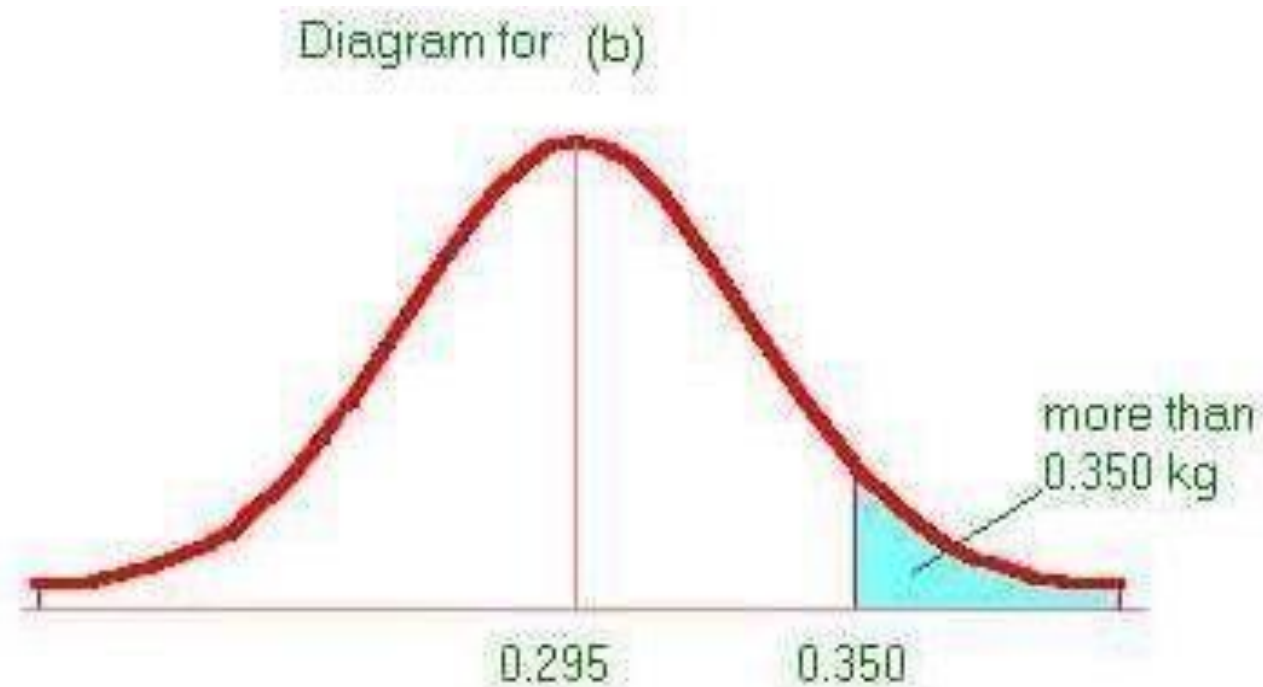
What is the probability that the pack weighs less than 0.280 kg?



Mean	0.295
Std	0.025
X	0.28
Probability	0.274

❖ So here the probability that the pack will weigh less than 0.280 kg is 27.4 %.

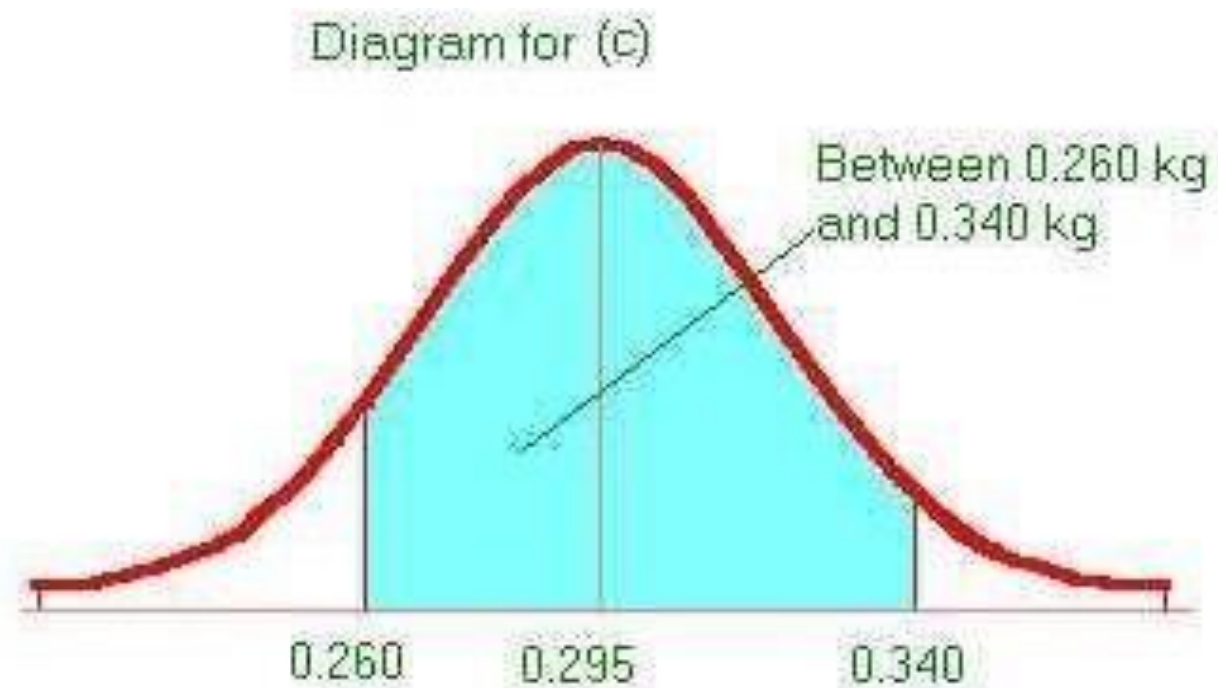
What is the probability that the pack weighs more than 0.350 kg?



Mean	0.295
Std	0.025
X	0.35
Probability	0.014

❖ So here the probability that the pack will weigh more than 0.350 kg is 1.4 %.

The sales team is negotiating with a new customer who has more stringent quality requirements. The new customer requires packs which should be between 0.260 and 0.340 kg. What is the probability that a pack produces by the current process will be acceptable to the new customer?



- ❖ Here the probability that the pack will weigh between 0.26kg and 0.34kg is 88.3%.

Mean	0.295
Std	0.025
X1	0.26
X2	0.34
Cummulative Probability of X1	0.080757
Cummulative Probability of X2	0.96407
Required Probability	0.883

What is the weight for which 99% of the packs produced will be less than the weight?

Mean	0.295
Std	0.025
Probability	0.99
X	0.353

❖ Here 99% of the packs produced will be below 0.353 Kg weight