Answer on Question #68050 – Math – Statistics and Probability

Question

If X is a normal variable with the mean $\mu = 5$ and variance $(\sigma^2) = 16$, what is the probability that X is less than or equal to 6?

Solution

First of all, note that if $\sigma^2 = 16$ then $\sigma = 4$. Further, if X is a normal variable then

$Y = \frac{X-\mu}{\sigma} = \frac{X-5}{4}$ is a normal variable with mean 0 and variance (and standard deviation) 1

(see https://en.wikipedia.org/wiki/Normal_distribution). The required probability is

$P\{X \le 6\} = P\left\{\frac{X-5}{4} \le \frac{6-5}{4}\right\} = P\{Y \le 0.25\}$. Due to the symmetry of the distribution of $P\{Y \le 0\} = 0.5$. Then $P\{Y \le 0.25\} = P\{Y \le 0\} + P\{0 < Y \le 0.25\} =$

$= 0.5 + P\{0 < Y \le 0.25\}$. The last probability we can find from the Standard Normal Distribution table (see https://www.mathsisfun.com/data/standard-normal-distribution-table.html): $P\{0 < Y \le 0.25\} = 0.0987$. Then $P\{Y \le 0.25\} = 0.5 + 0.0987 = 0.5987$.

Answer: 0.5987.