MCQS

The standard normal distribution is:

a) skewed to the right.
b) also called the t distribution.
c) an approximation of the binomial distribution.
d) defined by a mean equal to 0 and a standard deviation equal to 1.**

X is a random normal variable, with mean μ and variance σ^2. The "standardized form" of X is $Z = \frac{X-\mu}{\sigma}$. What are the mean and variance, respectively, of Z?

a) 2, 0
b) 1, 0
c) 0, 1**
d) 2, 1

Let X~N (4, 2^2). Which of the following is a standard normal variable?

a) $Z = \frac{X-4}{4}$

b) $Z = \frac{X-2}{4}$

c) $Z = \frac{X-4}{2}$

d) $Z = \frac{X-2}{2}$

The normal distribution is a _____ distribution.

a) Symmetrical**
b) Positively Skewed
c) Negatively Skewed
d) Uniform

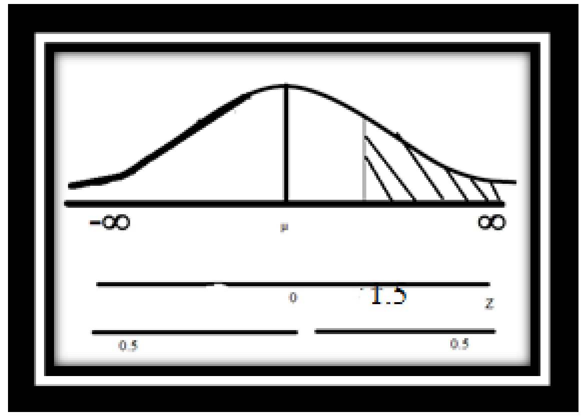
Let the random variable Z have the standard normal distribution. Find P $(0 \le Z \le 2)$.

$P(0 \le Z \le 2) = P(0 \le Z \le 2)$

$= 0.4772.$

Let the random variable Z have the standard normal distribution. Find P (Z≥1.5).

P(Z≥1.50) = P(0<Z<∞) – P(0<Z<1.50)

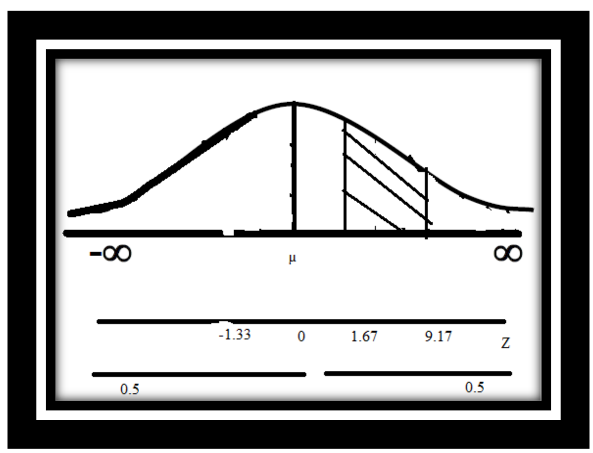


= 0.5 – 0.4332 = 0.0668.

A random variable *X* is normally distributed with µ = 45 and σ^2 = 36. Find the probability that it will lie between 55 and 100.

P(55<X<100) = $P(\frac{55-45}{6} < \frac{X-\mu}{\sigma} < \frac{100-45}{6})$

$= P(1.67 < \text{Z} < 9.17)$



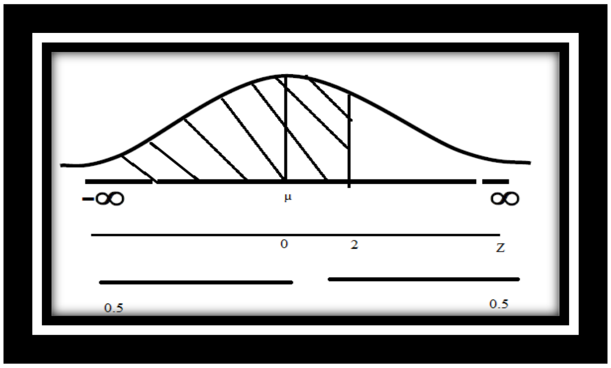
= P(0<Z<9.17) – P(0<Z<1.67)

= 0.5 – 0.4525 = 0.0475.

A random variable X is normally distributed with μ = 45 and σ^2 = 36. Find the probability that it will be smaller than 57.

P(X<57) = $P(\frac{X-\mu}{\sigma} < \frac{57-45}{6})$

$= P(Z < 2)$



= P(-∞<Z<0) + P(0<Z<2)

= 0.5 + 0.4772 = 0.9772.

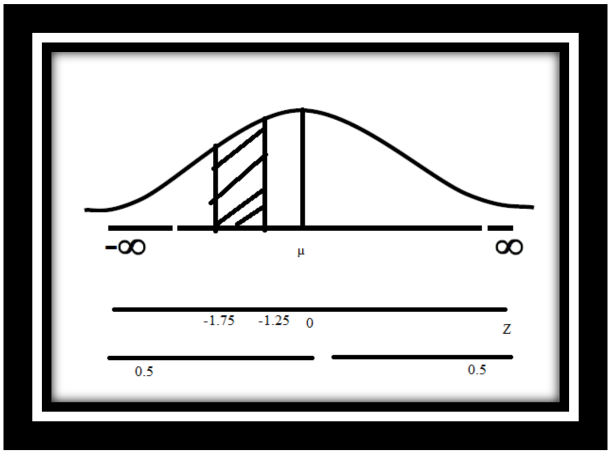
Suppose that weights of 2000 male students are normally distributed with mean 155 pounds and standard deviation 20 pounds. Find the probability that:

(i) The students weight lie between 120 and 130 pounds.
(ii) The students weight less than or equal to 100 pounds.

Solution:

P(120<X<130) = $P(\frac{120-155}{20} < \frac{X-\mu}{\sigma} < \frac{130-155}{20})$

$= P(-1.75 < Z < -1.25)$

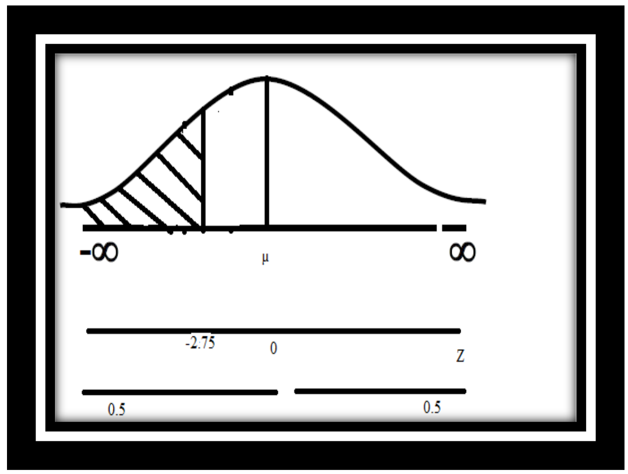


$= P(Z<-1.75) - P(Z<-1.25)$

$= 0.4599 – 0.3944 = 0.0655$

(ii)

$$P(X<100) = P\left(\frac{X-\mu}{\sigma} < \frac{100-155}{20}\right)$$
$$= P(Z < -2.75)$$



$= P(-\infty<Z<0) – P(-2.75<Z<0)$
$= 0.5 – 0.4970 = 0.003.$

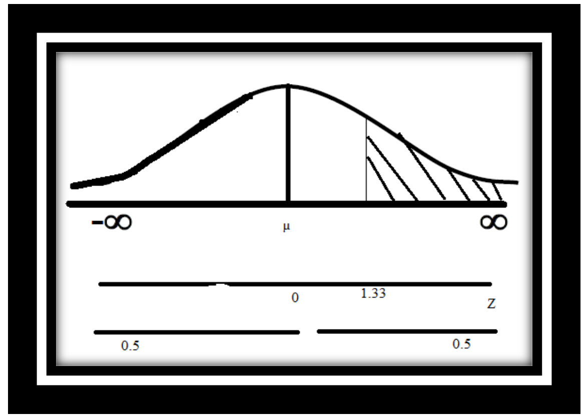
A soft drink machine is regulated so that it discharges an average of 200 milliliters per cup. If the amount of drink is normally distributed with a standard deviation equal to 15 milliliters,

a) What fraction of the cups will contain more than 220 milliliters?
b) What is the probability that a cup contains between 180 and 200 milliliters?

(Probability of z equal to 1.33 is 0.4082)

Solution:

$$P(X>220) = P\left(\frac{X-\mu}{\sigma} > \frac{220-200}{15}\right)$$
$$= P(Z > 1.33)$$

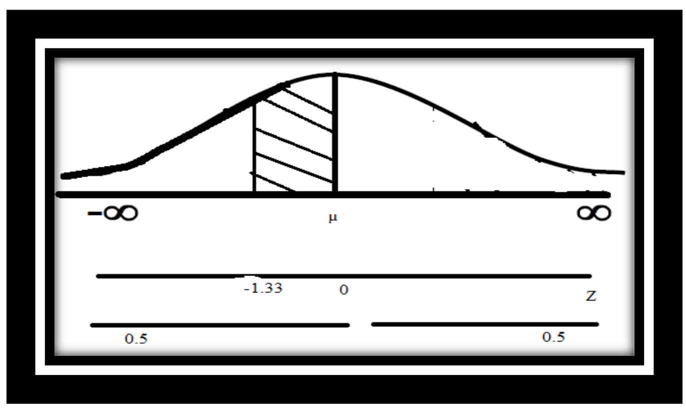


$= P(0<Z<\infty) - P(0<Z<1.33)$

$= 0.5 - 0.4082 = 0.0918.$

b)

$$P(180<X<200) = P\left(\frac{180-200}{15} < \frac{X-\mu}{\sigma} < \frac{200-200}{15}\right)$$
$$= P(-1.33 < Z < 0)$$



=.4082