**Given :**The current age (in years) of 400 clerical employees at an insurance claims processing center is normally distributed with mean 38 & SD = 6

**To find :** True/False. for A. More employees at the processing center are older than 44 than between 38 and 44. B. A training program for employees under the age of 30 at the center would be expected to attract about 36 employees

**Solution:**

Mean = 38

SD = 6

Z score = (Value - Mean)/SD

Z score for 44  = (44 - 38)/6  = 1  =>  84.13 %

=> People above 44 age = 100 - 84.13 =  15.87%  ≈  63    out of 400

Z score for 38  = (38 - 38)/6 = 0 => 50%

Hence People between 38 & 44  age = 84.13 - 50 = 34.13 % ≈  137 out of 400

Hence More employees at the processing center are older than 44 than between 38 and 44. is F**ALSE**

Z score for 30  = (30 - 38)/6 =  -1.33  =  9.15  %   ≈ 36 out of 400

Hence A training program for employees under the age of 30 at the center would be expected to attract about 36 employees - **TRUE**

If X1 ~ N(μ, σ2) and X2 ~ N(μ, σ2) are iid normal random variables, then what is the

difference between 2 X1 and X1 + X2? Discuss both their distributions and parameters.

If *X*1, *X*2, ..., *Xn* are i.i.d., all having the same distribution as the random variable *X*, then

E(BAR-*X*) = (1/*n*) E(*X*1 + *X*2 + ... + *Xn*)  
    = (1/*n*) *n* E(*X*) = E(X)

2.

A *directed graphical model* (also called a Bayesian network or a belief network) is a way of specifying a joint probability distribution for several random variables via a simplification of the multiplication rule.

Recall that any joint probability mass function, say for *X*, *Y*, and *Z* can be written (in notation abbreviating *X*=*x* to ust *x*) using the multiplication rule as

P(*x*,*y*,*z*) = P(*x*) P(*y*|*x*) P(*z*|*x*,*y*)

If *X* is conditionally independent (C.I.) of *Y* given *Z*, we can simplify P(*z*|*x*,*y*) to P(*z*|*y*).

P(2X1) is

P(X1\*X2)= P(X1)\*P(X2|X1)

Two values symmetric about mean for the given standard normal distribution are[48.5,151.5]

**Step-by-step explanation:**

Given:  p(a<x<b) = 0.99 ,m ean =100,standardDeviation = 20

To Find:

Identify symmetric values for the standard normal distribution such that the area enclosed is .99

From the above details,we have to excluded area of .005 in each of the left and right tails. Hence, we want to find the 0.5th and the 99.5th percentiles Z score values

Using Python

Z value is given as stats.norm.ppf(pvalue)

Z value at 0.5th percentile is given as

                                         Z(0.5) = stats.norm.ppf(0.005)= -2.576

Z value at 99.5 percentile is given as

                         Z(99.5) = stats.norm.ppf(0.995) = 2.576

Z = (x - 100)/20 = > x = 20z+100

      a = -(20\*2.576) + 100= 48.5

      b = (20\*2.576)+100= 151.5

Two values symmetric about mean for the given standard normal distribution are[48.5,151.5]

We can view a random variable *Y* that has the binomial(*n*,*p*) distribution as the sum of *n* i.i.d. random variables that all have the Bernoulli(*p*) distribution. That is, we let

*Y* = *X*1 + *X*2 + ... + *Xn*

where *X*1, *X*2, ..., *Xn* are i.i.d. with the Bernoulli(*p*) distribution.

Recall that the mean of a Bernoulli(*p*) random variable is *p*. We can also compute that the variance of a Bernoulli(*p*) random variable is

*p* (1-*p*)2 + (1-*p*) (0-*p*)2 = *p* (1-*p*)

From this and the theorem above about sums of i.i.d. random variables, we can conclude that if *Y* has then binomial(*n*,*p*) distribution, the E(*Y*) = *np* and Var(*Y*) = *np*(1-*p*).