Answer on Question #60483 – Math – Statistics and Probability

Question

Crispy Chips is a potato chip company that is quite popular for its low-fat, low-calorie bags of potato chips. The procedure used at its production plant allows for 65 chips to be inserted into each bag for distribution to consumers. However, given that chip-making is not an exact science, there is a standard deviation of 5 chips per individual bag. If we can assume that the amount of chips in each bag forms a normal distribution, calculate the following:

a) Calculate the z-score if there are 60 chips in a bag.

b) What is the probability that less than 60 potato chips will be in a bag?

c) Determine the probability that more than 80 potato chips will be in a bag.

d) Find the probability that there will be between 55 and 80 potato chips in a bag.

Solution

Given X is a normally distributed random variable with parameters $\mu = 65, \sigma = 5,$ the probability $P(Z < z)$ was calculated using z-table.

a) The z-score if there are 60 chips in a bag:

$z = \frac{X-\mu}{\sigma} = \frac{60-65}{5} = -1.$

b) The probability that less than 60 potato chips will be in a bag:

$$P(X < 60) = P\left(Z < \frac{60-65}{5}\right) = P(Z < -1) = 0.1587.$$

c) The probability that more than 80 potato chips will be in a bag:

$$P(X > 80) = P\left(Z > \frac{80-65}{5}\right) = P(Z > 3) = 1 - P(Z < 3) = 1 - 0.9987 = 0.0013.$$

d) The probability that there will be between 55 and 80 potato chips in a bag:

$$P(55 < X < 80) = P\left(\frac{55-65}{5} < Z < \frac{80-65}{5}\right) = P(-2 < Z < 3) = P(Z < 3) - P(Z < -2) =$$
$$= 0.9987 - 0.0228 = 0.9759.$$

Answer: a) -1; **b)** 0.1587; **c)** 0.0013; **d)** 0.9759.