Exercise 1:

From a population with a mean of 400 and a variance of 1600, a random sample of 35 was taken.

(a) What is the probability that the sample mean is greater than 412?

Solution:

Given μ = 400, σ = √1600 = 40, n = 35

$$z = \frac{x - \mu}{\sigma/\sqrt{n}} = \frac{412 - 400}{\frac{40}{\sqrt{35}}} = 1.775$$

P(X > 412) = P(z > 1.775) = 0.0379

Answer: 0.0379

(b) What is the probability that the sample mean is between 393 and 407?

Solution:

Given μ = 400, σ = √1600 = 40, n = 35

$$z = \frac{x - \mu}{\sigma/\sqrt{n}} = \frac{393 - 400}{\frac{40}{\sqrt{35}}} = -1.035$$

$$z = \frac{x - \mu}{\sigma/\sqrt{n}} = \frac{407 - 400}{\frac{40}{\sqrt{35}}} = 1.035$$

P(393 < X < 407) = P(-1.035 < z < 1.035) = 1 – 2*P(z<-1.035) = 1 -2*0.1503 = 0.6994

Answer: 0.6994

(c) What is the probability that the sample mean is less than 389?

Solution:

Given μ = 400, σ = √1600 = 40, n = 35

$$z = \frac{x - \mu}{\sigma/\sqrt{n}} = \frac{389 - 400}{\frac{40}{\sqrt{35}}} = -1.627$$

P(X < 389) = P(z < -1.627) = 0.0519

Answer: 0.0519

Exercise 2:

A company that produces breakfast cereals packages them in boxes of 200 grams with a standard deviation of 6 grams. The population distribution of box weights is normal. Whether buy 4 boxes that can be considered a MAS be all that produced.

(a) What is the probability that average weight of these 4 boxes is less than 197?

Solution:

Given μ = 200, σ = 6, n = 4

$$z = \frac{x-\mu}{\sigma/\sqrt{n}} = \frac{197-200}{\frac{6}{\sqrt{4}}} = -1$$

P(X < 197) = P(z < -1) = 0.1587

Answer: 0.1587

(b) What is the probability that average weight is greater than 206?

Solution:

Given μ = 200, σ = 6, n = 4

$$z = \frac{x-\mu}{\sigma/\sqrt{n}} = \frac{206-200}{\frac{6}{\sqrt{4}}} = 2$$

P(X > 206) = P(z >2) = 0.0228

Answer: 0.0228

(c) What is the probability that average weight is between 195 and 205?

Solution:

Given μ = 200, σ = 6, n = 4

$$z = \frac{x-\mu}{\sigma/\sqrt{n}} = \frac{195-200}{\frac{6}{\sqrt{4}}} = -1.67$$

$$z = \frac{x-\mu}{\sigma/\sqrt{n}} = \frac{205-200}{\frac{6}{\sqrt{4}}} = 1.67$$

P(195 < X < 205) = P(-1.67 < z < 1.67) = 1 -2*P(z < -1.67) = 1 – 2* 0.0475 = 0.905

Answer: 0.905