Date: 10-08-2017

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Probability-Assignment-1

**Question:**

The maximum weight that an elevator in an apartment complex can accommodate is 800kg. The average adult weight be about 70 kgs with a variance of 200. What is the probability that the lift safely reaches the ground when there are 10 adults in the lift. What if there are 12 adults?

**Answer:**

µ = 70kgs

Var = 200;

sd = sqrt(200);

Distribution of weight is continuous, hence normal distribution is assumed.

1. Required to find probability of lift with 10 adults reaching ground safely i.e., probability of average weight of adults not exceeding 800/10 = 80Kgs.

Let average weight of adults be “W”. So, we need to find P(W < 80).

z = (W- µ) / sd

= (80-70)/sqrt(200)

= 10/(10sqrt(2) = 1/sqrt(2) = 0.707168 = 0.71.

P(W<80) = P(Z < ((80-70)/sqrt(200)) = P(Z < 0.71) = 0.7611 or 76.11%

Using “R” programming

P(W<80) = pnorm(q=80,mean=70,sd = sqrt(200),T)

= 0.7602 = 76.02%

1. Required to find probability of lift with 12 adults reaching ground safely i.e., probability of average weight of adults not exceeding 800/12 = 65Kgs.

Let average weight of adults be “W”. So, we need to find P(W < 65).

z = (W- µ) / sd

= (65-70)/sqrt(200)

= -5/(10sqrt(2) = -1/2sqrt(2) = -0.3535 .

P(W<65) = P(Z< ((65-70)/sqrt(200)) = (PZ < - 0.3535) = 0.3632 or 36.3%

Using “R” programming

P(W<65) = pnorm(q=65,mean=70,sd = sqrt(200),T)

= 0.3618 = 36.2%