Conditions

a hundred squash balls are tested by dropping from a height of 100 inches . A ball is fast if it rises above 32 inches the average height of bounce was 30 inches and Standard deviation was 3/4.what is the chance of getting a fast standard ball

Solution

For solving this, we must assume, that the test of these balls has approximately normal distribution.

Then, we must find the following probability:

$$P\left(\mu > \bar{X} + z_{\frac{1+\alpha}{2}}\frac{\sigma}{\sqrt{n}}\right) = 1 - P(\mu \le \bar{X} + z_{\frac{1+\alpha}{2}}\frac{\sigma}{\sqrt{n}})$$

We know, that

$$P\left(\bar{X} - z_{\frac{1+\alpha}{2}}\frac{\sigma}{\sqrt{n}} \le \mu \le \bar{X} + z_{\frac{1+\alpha}{2}}\frac{\sigma}{\sqrt{n}}\right) = \alpha$$

And

$$P\left(\bar{X} \le \mu \le \bar{X} + z_{\frac{1+\alpha}{2}}\frac{\sigma}{\sqrt{n}}\right) = \frac{\alpha}{2}$$

$$\bar{X} = 30$$

$$\sigma = \frac{3}{4}$$

$$n = 100$$

$$\mu \le 30 + z_{\frac{1+\alpha}{2}}\frac{\frac{3}{4}}{10} = 30 + 0.075 z_{\frac{1+\alpha}{2}} = 32$$

$$z_{\frac{1+\alpha}{2}} = \frac{2}{0.075}$$

$$z_{\frac{1+\alpha}{2}} \approx 26.6$$

Now we have to look at the Laplace function values for For this quantile the probability of

$$P\left(\bar{X} - z_{\frac{1+\alpha}{2}}\frac{\sigma}{\sqrt{n}} \le \mu \le \bar{X} + z_{\frac{1+\alpha}{2}}\frac{\sigma}{\sqrt{n}}\right) \approx 1$$

Hence, the probability of

$$P\left(\mu > \bar{X} + z_{\frac{1+\alpha}{2}}\frac{\sigma}{\sqrt{n}}\right) \approx 0$$

The event of getting the fast ball is almost impossible.

Answer: the probability is approximately 0