

Answer on Question #42077 – Math - Statistics and Probability

By the statement of this question, if $P(\xi < 2000) = 0.1$, $E(\xi) = 3000$, then

$P(3000 + b\eta < 2000) = 0.1$, b is standard deviation of ξ (it is unknown, it can be found from assumptions of this assignment). Rewrite the last equality

$$P\left(\eta < \frac{2000-3000}{b}\right) = 0.1, \text{ it means}$$

$$F_{\eta}\left(-\frac{1000}{b}\right) = 0.1, \text{ where } F_{\eta} \text{ is the standard normal cumulative distribution function.}$$

Take the argument corresponding to a value of 0.1 of the standard normal cumulative distribution function from corresponding tables. We define

$$-\frac{1000}{b} \approx -1.28 \text{ (more exactly } -\frac{1000}{b} = \text{NORMSINV}(0.1) = -1.28155 \text{ via an Excel function).}$$

$$\text{So, } -\frac{1000}{b} = -1.28155, \text{ from where we conclude}$$

$$b = \frac{1000}{1.28155} = 780.3051.$$

Rewrite

$$P(\xi < 2000 + x) = 0.03 \text{ and obtain } P(3000 + b\eta < 2000 + x) = 0.03 \text{ or } P\left(\eta < \frac{x-1000}{b}\right) = 0.03.$$

In similar way,

$$\frac{x-1000}{b} = -1.88079, \text{ whence}$$

$$x = -1.88079 * b + 1000 = -1.88079 * 780.3051 + 1000 = -467.59.$$

Finally, we set a new value $2000 + x = 2000 - 467.59 = 1532.41$

Answer: 1532.41