

Cambridge International AS & A Level

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Mathematics

9709/52

Paper 5 Probability & Statistics 1

May/June 2021

Question No (2)

- 2 The weights of bags of sugar are normally distributed with mean 1.04 kg and standard deviation σ kg. In a random sample of 2000 bags of sugar, 72 weighed more than 1.10 kg.

Find the value of σ .

Solution:

Given data
mean, $\mu = 1.04$

Standard deviation, $\sigma = ?$

According to the given condition

$$P(X > 1.10) = \frac{72}{2000} \\ = 0.036$$

$$P\left(\frac{X - \mu}{\sigma} > \frac{1.10 - 1.04}{\sigma}\right) = 0.036$$

standardizing

$$Z = \frac{X - \mu}{\sigma}$$

$$P\left(Z > \frac{0.06}{\sigma}\right) = 0.036$$

$$\therefore P(Z > a) = 1 - \Phi(a)$$

$$1 - \Phi\left(\frac{0.06}{\sigma}\right) = 0.036$$

$$\Phi\left(\frac{0.06}{\sigma}\right) = 1 - 0.036 \\ = 0.964$$

$$\frac{0.06}{\sigma} = \Phi^{-1}(0.964) \\ = 1.798$$

from distribution table

$$\sigma = \frac{0.06}{1.798}$$

$$\sigma = 0.0334 \quad \underline{\text{Ans}}$$

