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(4.) formula:-

$$\frac{1}{S_1} + \frac{1}{S_2} = \frac{1}{f}$$

→ sample mean $\bar{S}_1 = 26.6$ cm

→ sample mean $\bar{S}_2 = 13.8$ cm

$\sigma S_1 = 0.1$ cm
$\sigma S_2 = 0.5$ cm

→ use delta method
→ z - test for the hypothesis
→ P- value for the test

→ null Hypothesis : $H_0 : \mu_0 = 9$ cm
Alternative Hypothesis : $H_a : \mu_1 > 9$ cm

$\cancel{\mu_1 = \mu_2}$

$\mu_1 = 9$ cm of focal length
$\mu_2 = 9.1$ cm of focal length

$H_0 : \mu_1 = \mu_2$ → null hypothesis
$H_a : \mu_1 < \mu_2$ → Alternate hypothesis
(left tail Test)

$n_1 = 25$ $\quad \bar{x}_1 = 26.6$ $\quad \sigma_1 = 0.1$
$n_2 = 25$ $\quad \bar{x}_2 = 13.8$ $\quad \sigma_2 = 0.5$

α is not available, so, $\boxed{\alpha = 0.05}$

Scanned by TapScanner

$$\rightarrow z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

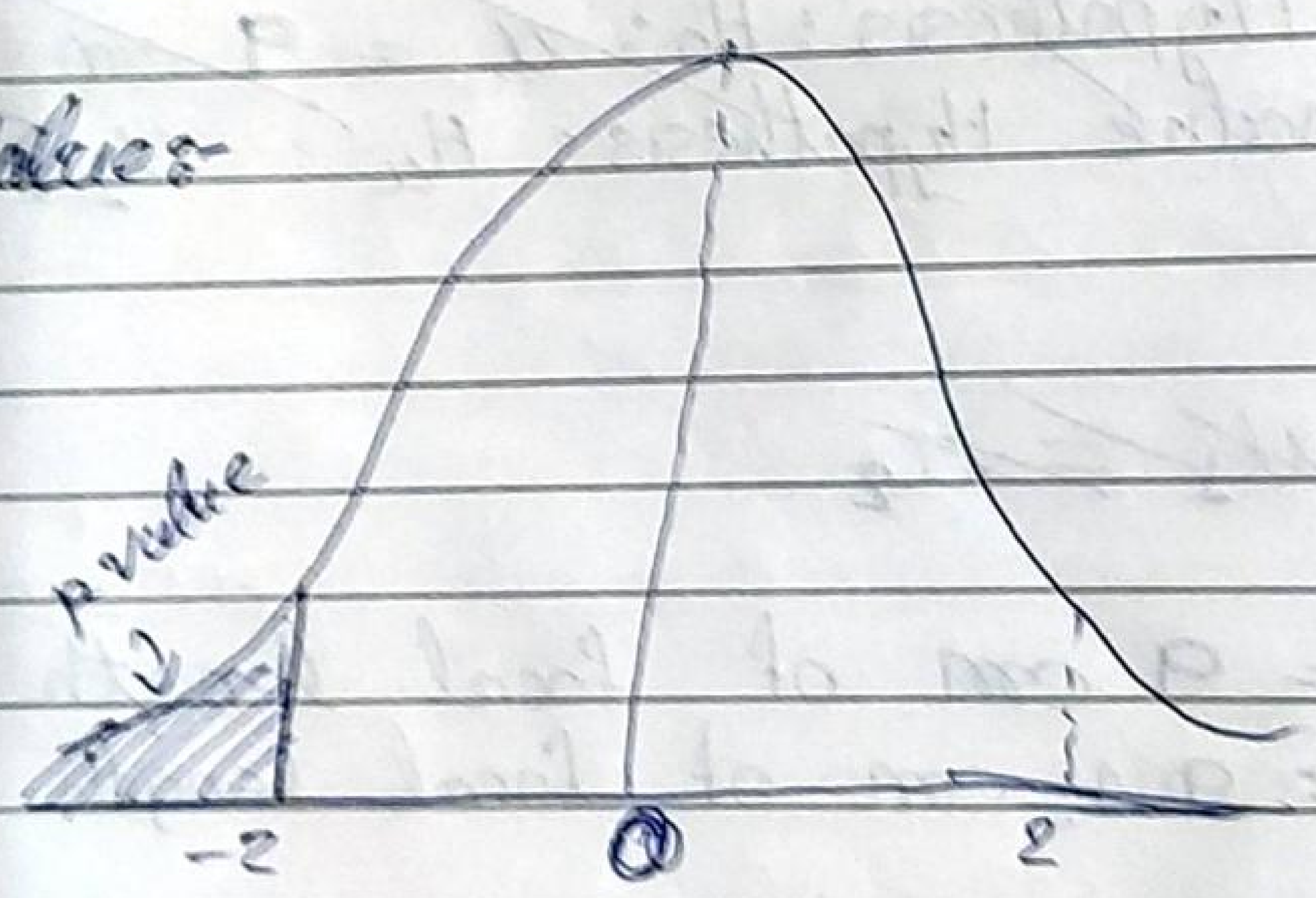
$$= \frac{(26.6 - 13.8) - (9 - 9.1)}{\sqrt{\frac{(0.1)^2}{25} + \frac{(0.5)^2}{25}}}$$

$$= \frac{12.8 - (-0.1)}{\sqrt{\frac{0.01}{25} + \frac{0.25}{25}}}$$

$$= \frac{12.9}{\sqrt{\frac{0.26}{25}}} = \frac{12.9}{0.10}$$

$= 125.514826$

* P-Values:-



$p = 1.0000 \quad (p(x \le 2) = 1.000)$

Since, p-value $> \alpha$

$1.000 > 0.05$

We will accept the null hypothesis.
The Avg. of Group-1's population is greater than or equal to the avg. of Group-2's population

→ Here, Zscore = 125.514326
& Zcritical = -1.6449 [as 95% critical accepted range]

Zscore > Zcritical
So, as per rule Zscore is greater than Zcritical we will accept the null hypothesis.

* ~~Conclusion :-~~
~~manufacturer was true, right. his statement of focal lenght size is of 9.1 cm rather than the 9cm. is true~~

* Conclusion :-
The statement, focal lenght size of lenses is rather than 9 cm.
~~manufacturer must take~~

* Two sample z-test :-