(3) null Hypothesis = $H_0 : \mu \leq 463$

Alternate Hypothesis = $H_a : \mu > 463$

→ We are going with one-tail test. [right-tail]

→ Confidence level = 98%

So, Significance level (α) = 100% - 98%
= 2%

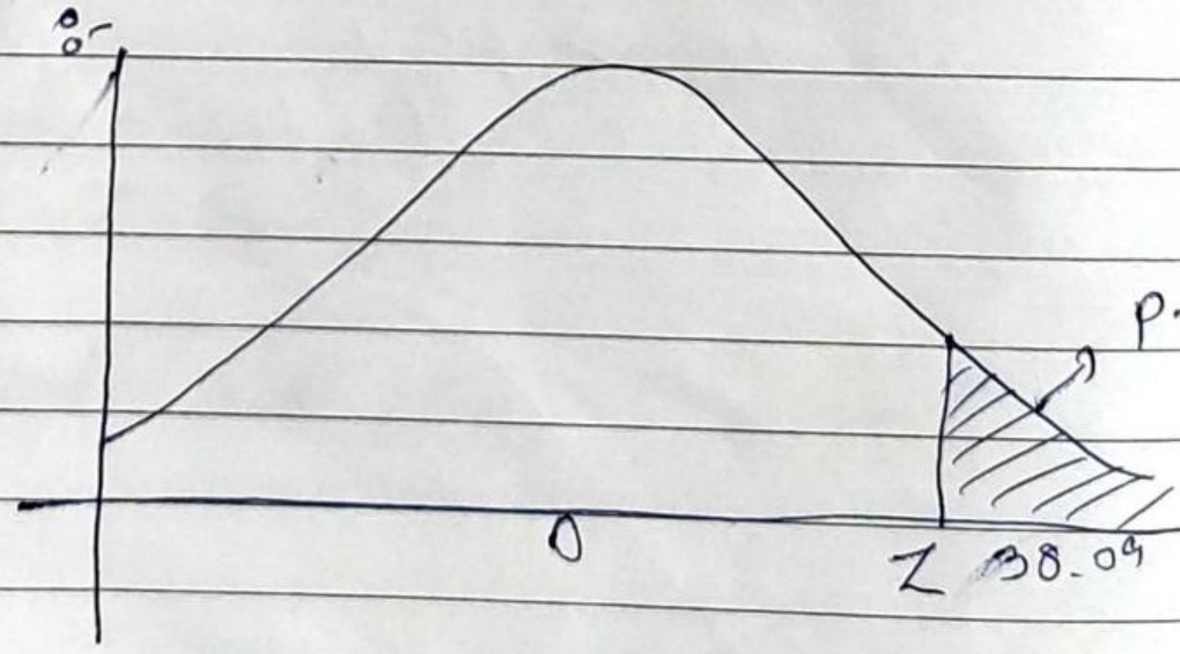
So, $\boxed{\alpha = 0.02}$

→ $Z\text{-test} = \dfrac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$

$= \dfrac{1600 - 469}{891/\sqrt{891}}$

Zscore = 38.09

* P-value :-



p-value = $P(Z > 38.09)$

$= 1 - P(Z \leq 38.09)$

$= 1 - 1.0000$

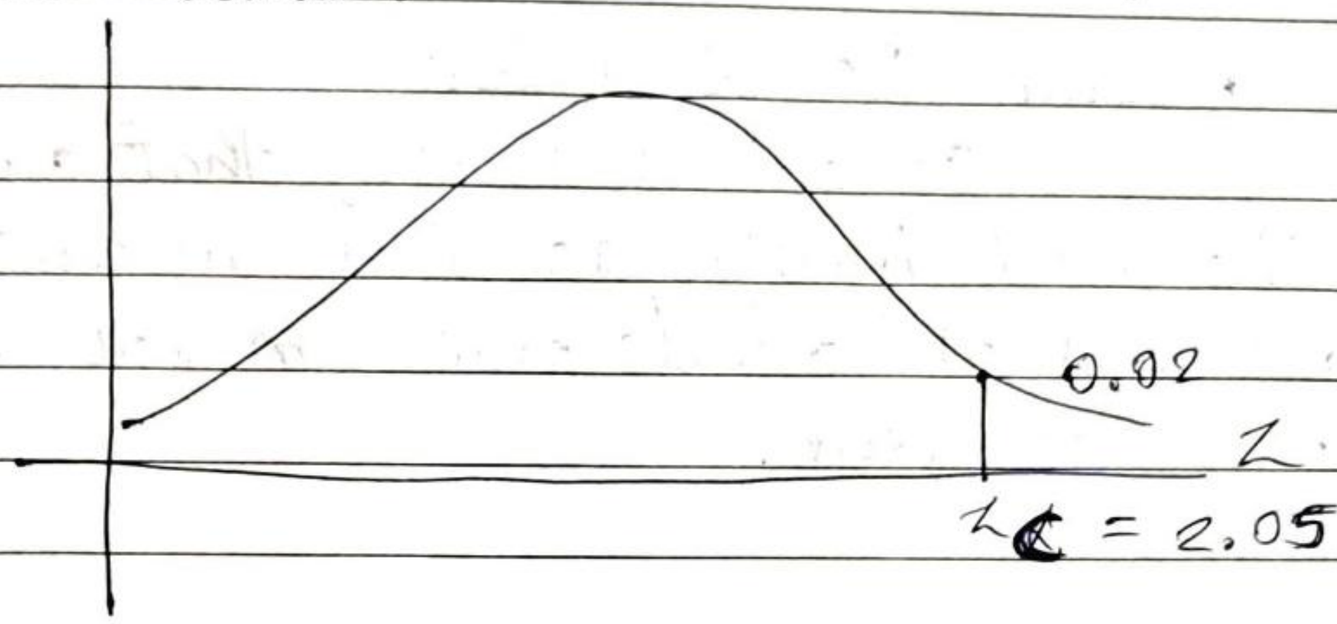
$= 0.0000$

if p-value $\leq \alpha$

So. $0.0000 < 0.02$

Here, we will reject the null hypothesis.

* Critical Value :-



$Z_c = 2.05$

Rule for Critical Value :-

$Z_s > Z_c$: reject the null hypothesis

$38.09 > 2.05$

So, we will reject the null hypothesis.

* Conclusion :-

$\mu > 463$

We can say that average adult population of non-smoker has been increased which seems that it is good health ration has been increased. We can say that people of adult has been taking care of there health ; they may ~~become~~ in taking much more healthy food.

(d)

if p=

if p = 0.46 or 0.48 or 0.50 or 0.52
means p-value is more than α value
which is 0.02

p-value > α - value

So, we can say that we will accept the null hypothesis that means avg. population of adults non-smoker has been not increased.