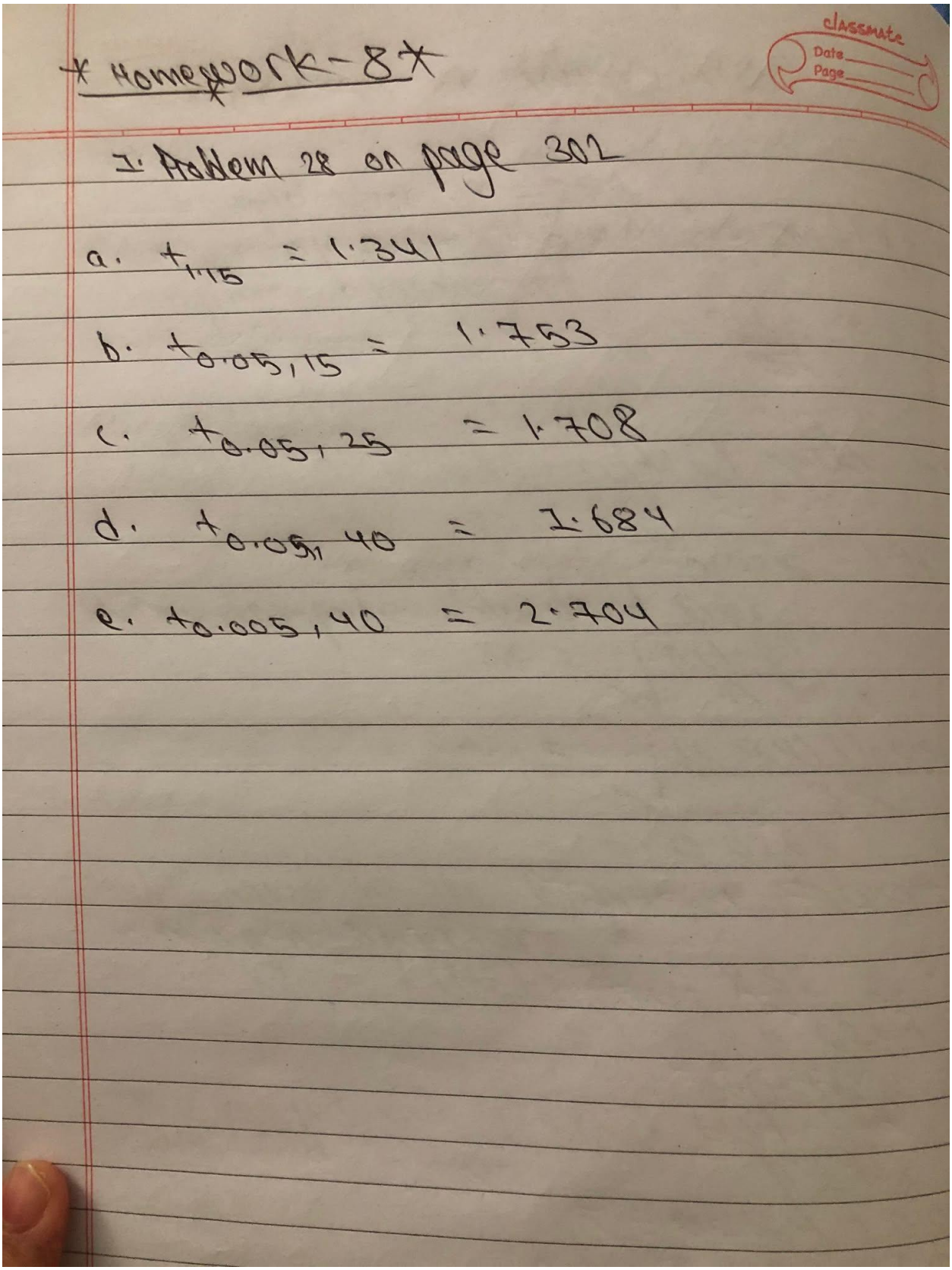


* Homework-8 *

1. Problem 28 on page 302

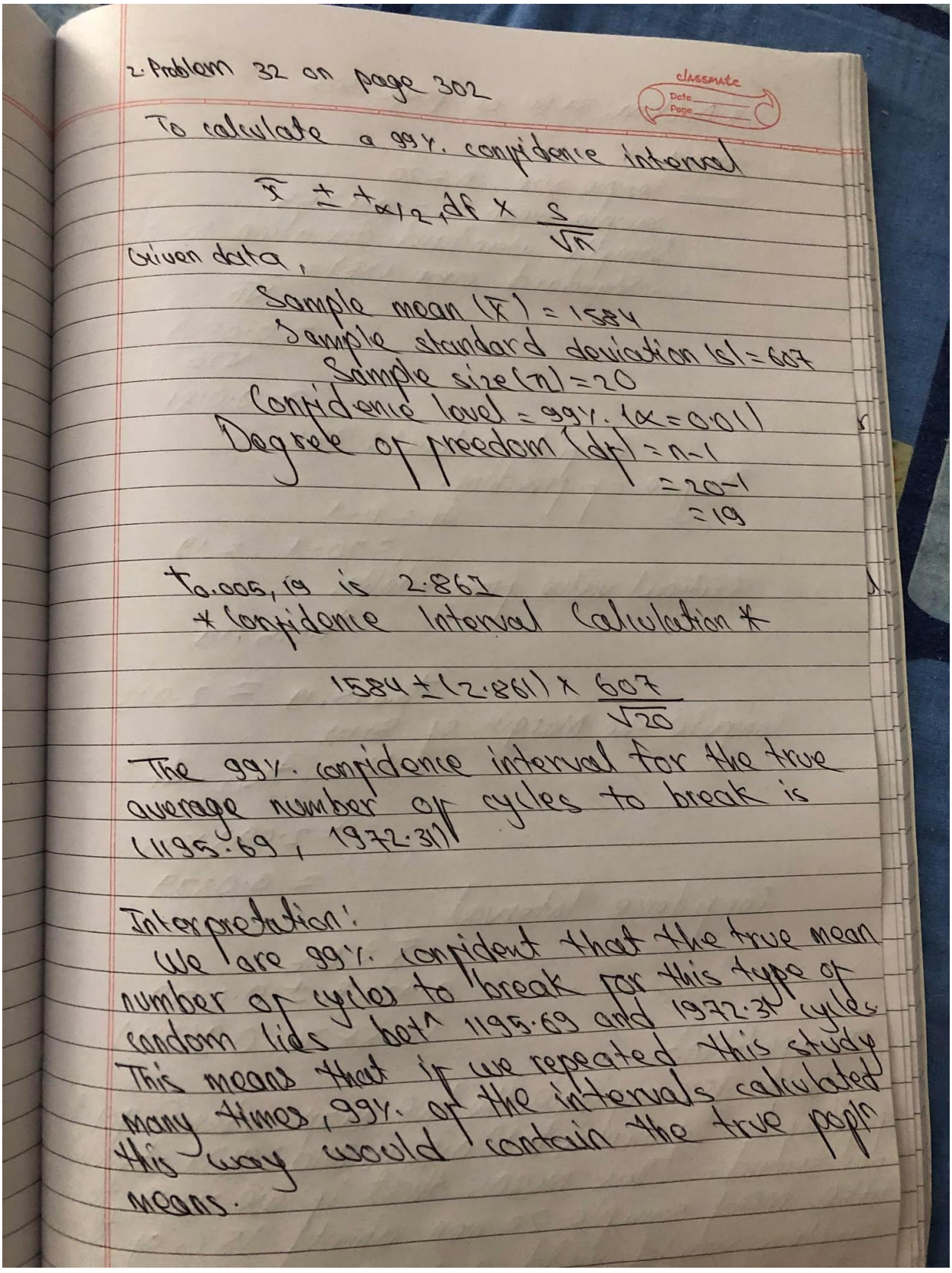
a. $t_{1,15} = 1.341$

b. $t_{0.05,15} = 1.753$

c. $t_{0.05,25} = 1.708$

d. $t_{0.05,40} = 1.684$

e. $t_{0.005,40} = 2.704$



2. Problem 32 on page 302

To calculate a 99% confidence interval

$$\bar{x} \pm t_{\alpha/2, df} \times \frac{s}{\sqrt{n}}$$

Given data,

Sample mean ($\bar{x}$) = 1584

Sample standard deviation (s) = 607

Sample size ($n$) = 20

Confidence level = 99% ($\alpha = 0.01$)

Degree of freedom (df) = $n - 1$

$= 20 - 1$

$= 19$

$t_{0.005, 19}$ is 2.861

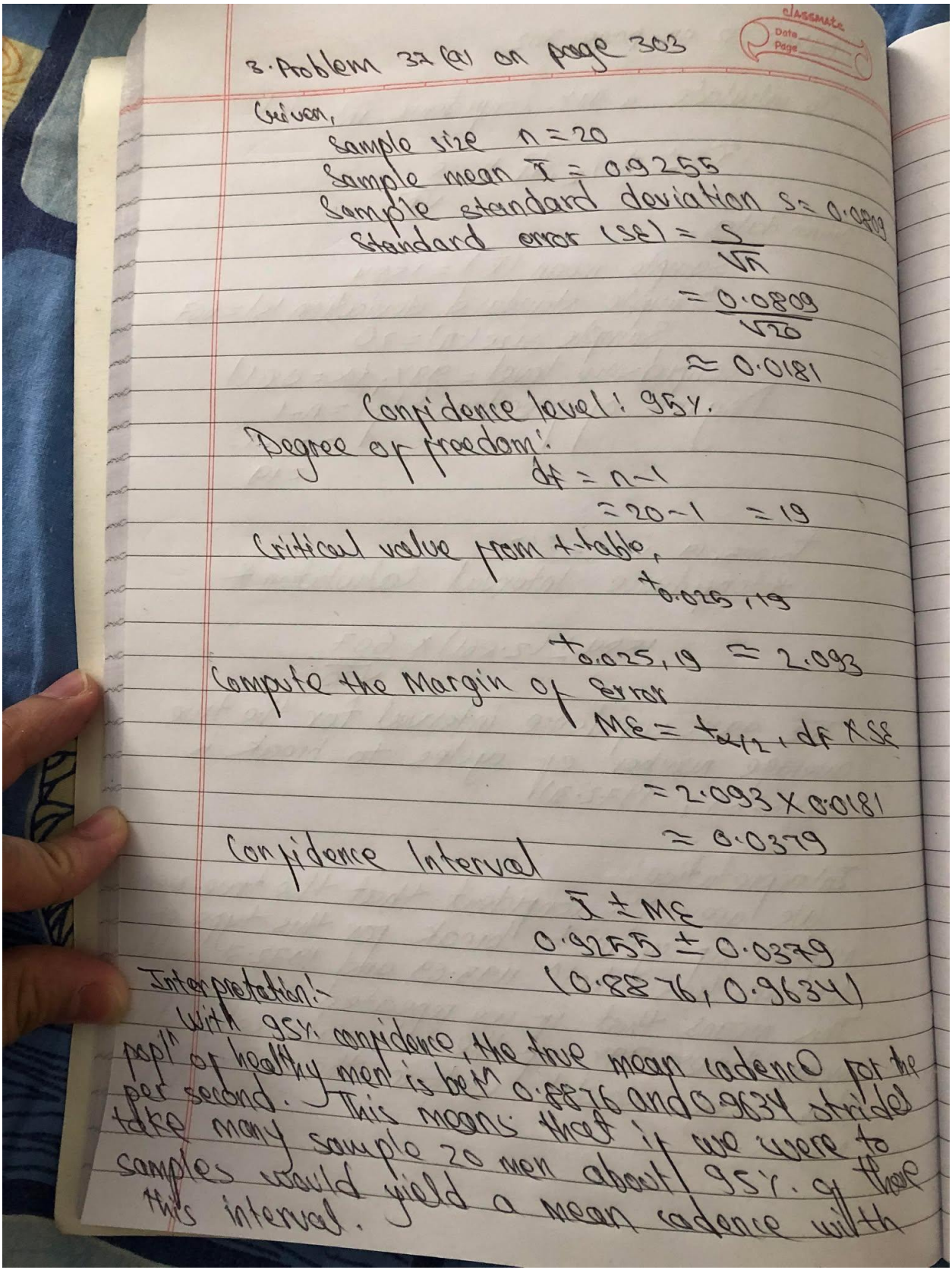
* Confidence Interval Calculation *

$$1584 \pm (2.861) \times \frac{607}{\sqrt{20}}$$

The 99% confidence interval for the true average number of cycles to break is (1195.69, 1972.31)

Interpretation:

We are 99% confident that the true mean number of cycles to break for this type of random lids lies between 1195.69 and 1972.31 cycles. This means that if we repeated this study many times, 99% of the intervals calculated this way would contain the true population means.



3. Problem 37 (a) on page 303

Given,

Sample size $n = 20$

Sample mean $\bar{x} = 0.9255$

Sample standard deviation $s = 0.0809$

Standard error $(SE) = \frac{s}{\sqrt{n}}$

$= \frac{0.0809}{\sqrt{20}}$

$\approx 0.0181$

Confidence level: 95%.

Degree of freedom:

$df = n - 1$

$= 20 - 1 = 19$

Critical value from t-table,

$t_{0.025, 19}$

$t_{0.025, 19} = 2.093$

Compute the Margin of error

$ME = t_{\alpha/2, df} \times SE$

$= 2.093 \times 0.0181$

$\approx 0.0379$

Confidence Interval

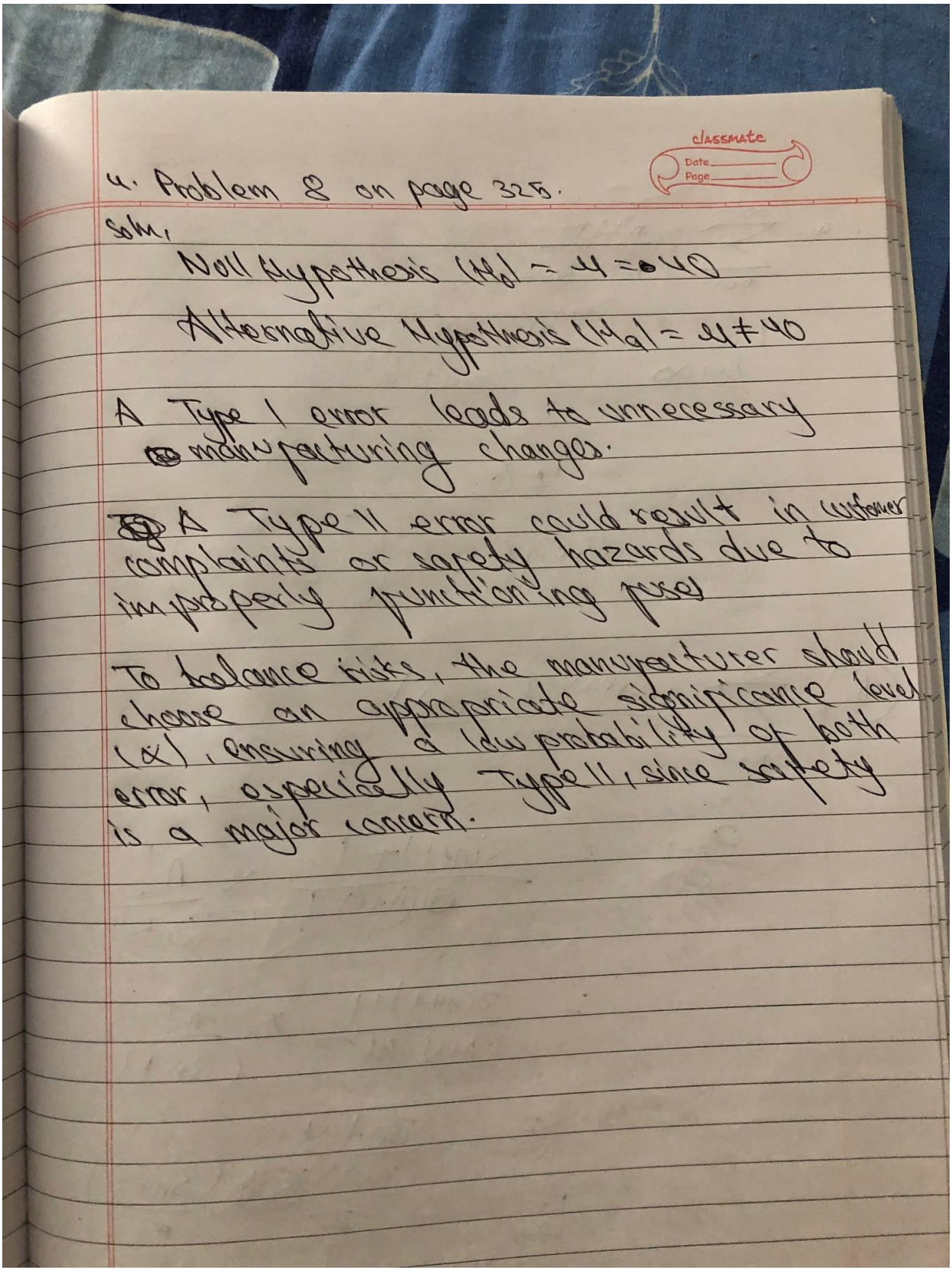
$\bar{x} \pm ME$

$0.9255 \pm 0.0379$

$(0.8876, 0.9634)$

Interpretation:-

With 95% confidence, the true mean cadence for the pop$^n$ of healthy men is between 0.8876 and 0.9634 strides per second. This means that if we were to take many sample 20 men about 95% of those samples would yield a mean cadence with this interval.



4. Problem 8 on page 325.

Soln,

Null Hypothesis ($H_0$) = $\mu = 0.40$

Alternative Hypothesis ($H_a$) = $\mu \neq 40$

A Type I error leads to unnecessary manufacturing changes.

A Type II error could result in customer complaints or safety hazards due to improperly functioning pins

To balance risks, the manufacturer should choose an appropriate significance level ($\alpha$), ensuring a low probability of both error, especially Type II, since safety is a major concern.