Homework - 6

Q.no.1 Problem 28 (a) (b) (c) (e) (g) (i) on page 169

a/w $P(0 \le Z \le 2.17)$

Using standard normal cumulative distribution

$P(Z \le 2.17) = \phi(2.17) = 0.9850$

$P(Z \le 0) = \phi(0) = 0.5000$

Thus

$P(0 \le Z \le 2.17) = 0.9850 - 0.5000$

$= 0.4850$

a/w $P(-2.50 \le Z \le 0)$

Using cumulative distribution function:

$P(Z \le 0) = 0.5000$

$P(Z \le -2.50) = \phi(-2.50) = 0.0062$

Thus,

$P(-2.50 \le Z \le 0) = 0.5000 - 0.0062$

$= 0.4938$

e/w

$P(Z \le 1.37)$

$= \phi(1.37) = 0.9147$

g/w

$P(-1.50 \le Z \le 2.00)$

Standard Normal curve Area.

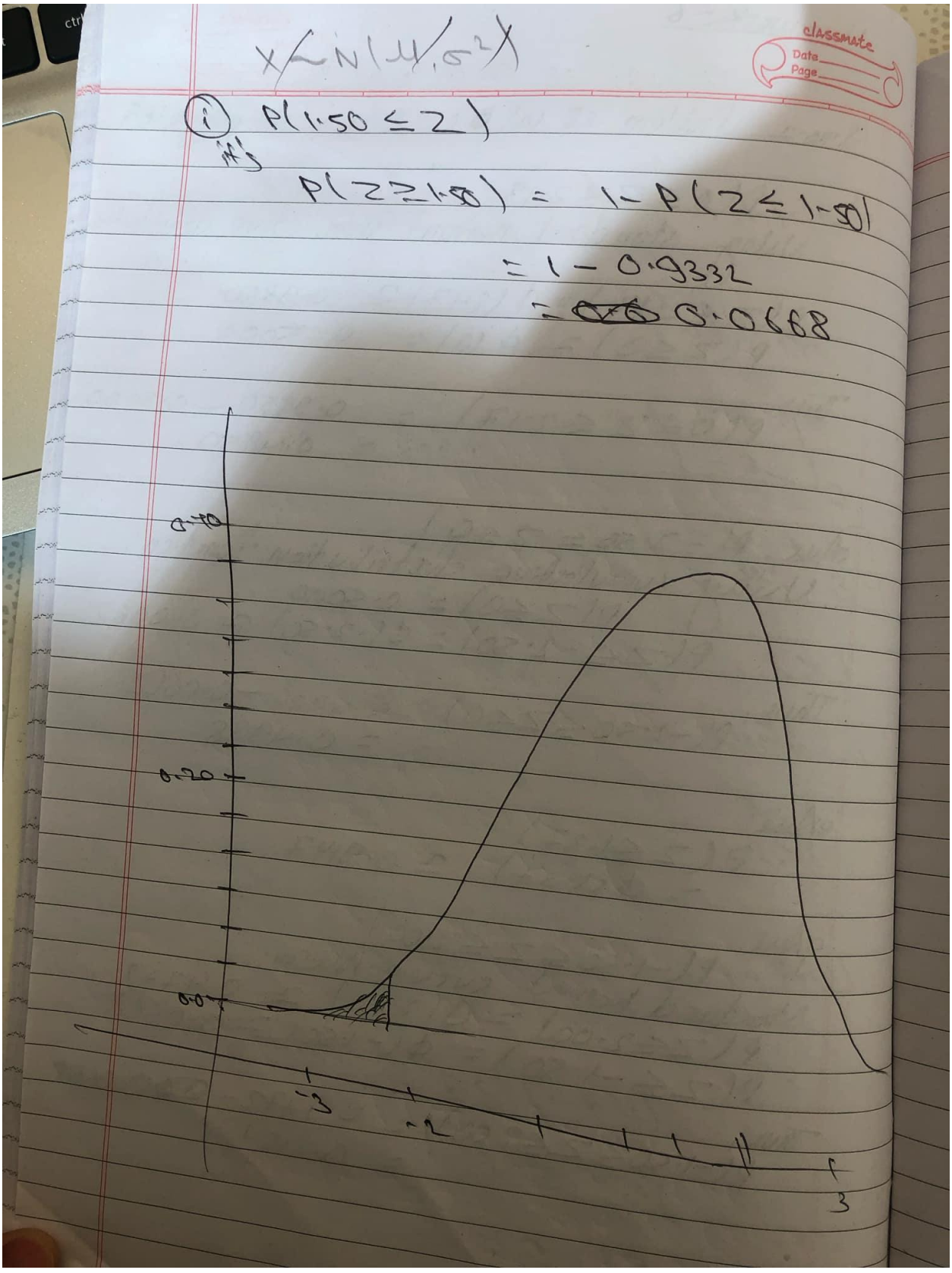
$P(Z \le 2.00) = \phi(2.00) = 0.9772$

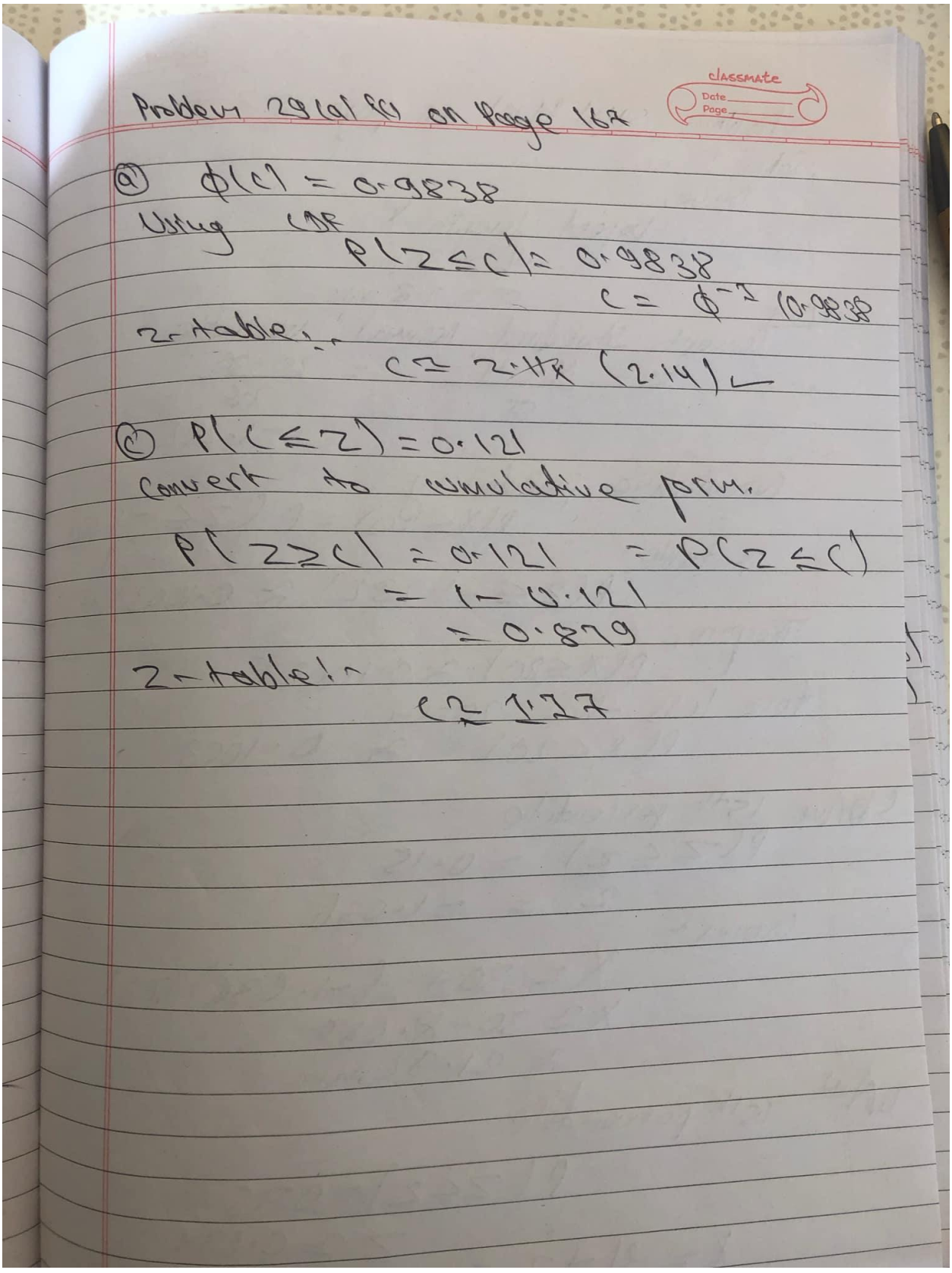
$P(Z \le -1.50) = \phi(-1.50) = 0.0668$

Thus,

$P(-1.50 \le Z \le 2.00) = 0.9772 - 0.0668$

$= 0.9104$


X ~ N(μ, σ²)
(i) P(1.50 ≤ Z)
P(Z ≥ 1.50) = 1 − P(Z ≤ 1.50)
= 1 − 0.9332
= 0.0668
0.40
0.20
0.0
−3
−2
3



Problem 29(a) & (c) on Page 162

(a) $\phi(c) = 0.9838$

Using CDF

$P(Z \leq c) = 0.9838$

$c = \phi^{-1}(0.9838)$

Z-table:-

$c \approx 2.14$ (2.14)

(c) $P(c \leq Z) = 0.121$

Convert to cumulative prm.

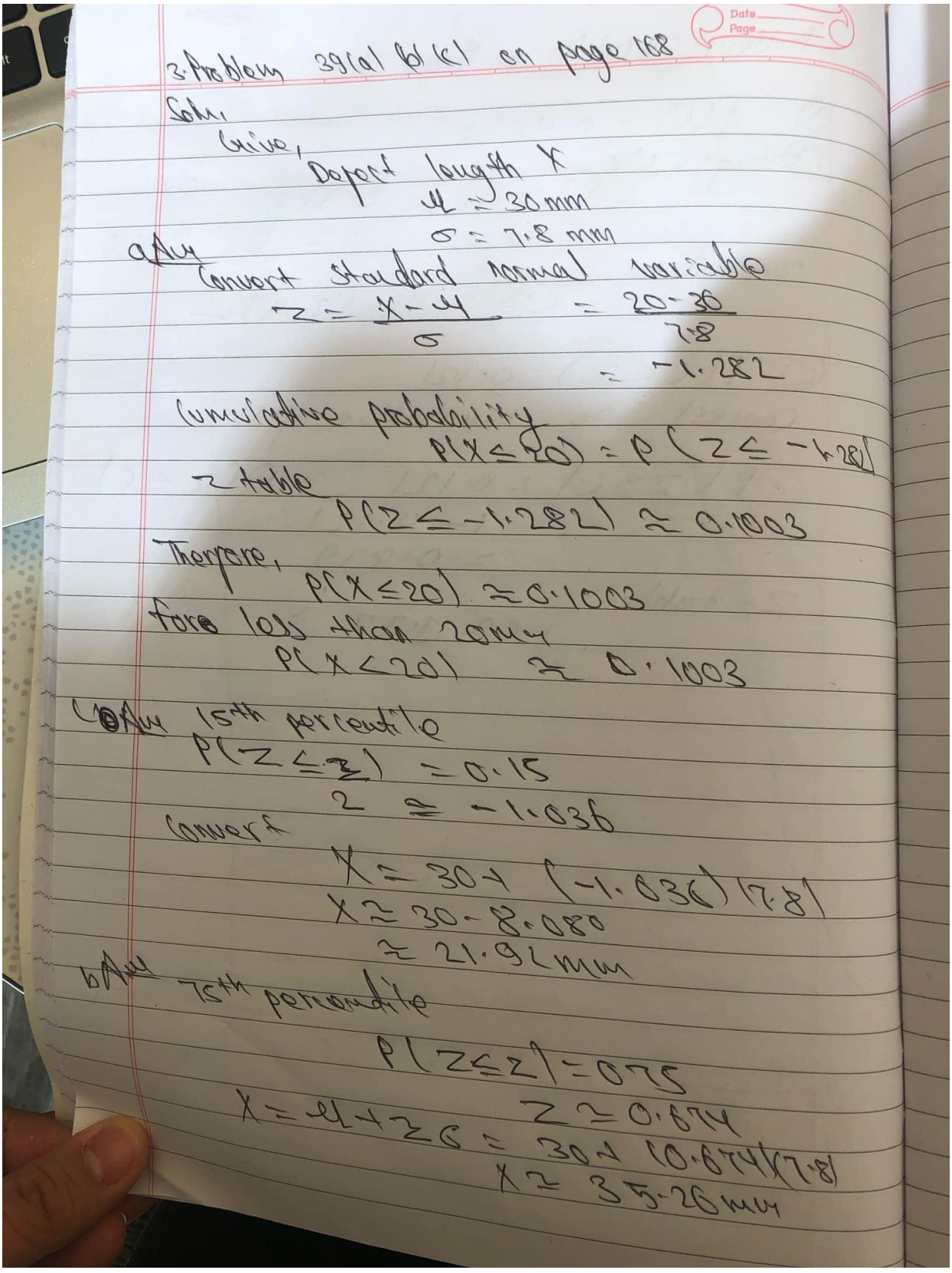
$P(Z \geq c) = 0.121 = P(Z \leq c)$

$= 1 - 0.121$

$= 0.879$

Z-table:-

$c \geq 1.17$



3. Problem 39(a) b (c) on page 168

Soln,

Given,

Depth length X

$\mu = 30\,mm$

$\sigma = 7.8\,mm$

a) Convert standard normal variable

$$Z = \frac{X - \mu}{\sigma} = \frac{20 - 30}{7.8} = -1.282$$

Cumulative probability

$P(X \leq 20) = P(Z \leq -1.282)$

Z table

$P(Z \leq -1.282) \approx 0.1003$

Therefore,

$P(X \leq 20) \approx 0.1003$

Fore less than 20mm

$P(X < 20) \approx 0.1003$

b) 15th percentile

$P(Z \leq z) = 0.15$

$z \approx -1.036$

Convert x

$X = 30 + (-1.036)(7.8)$

$X \approx 30 - 8.080$

$\approx 21.92\,mm$

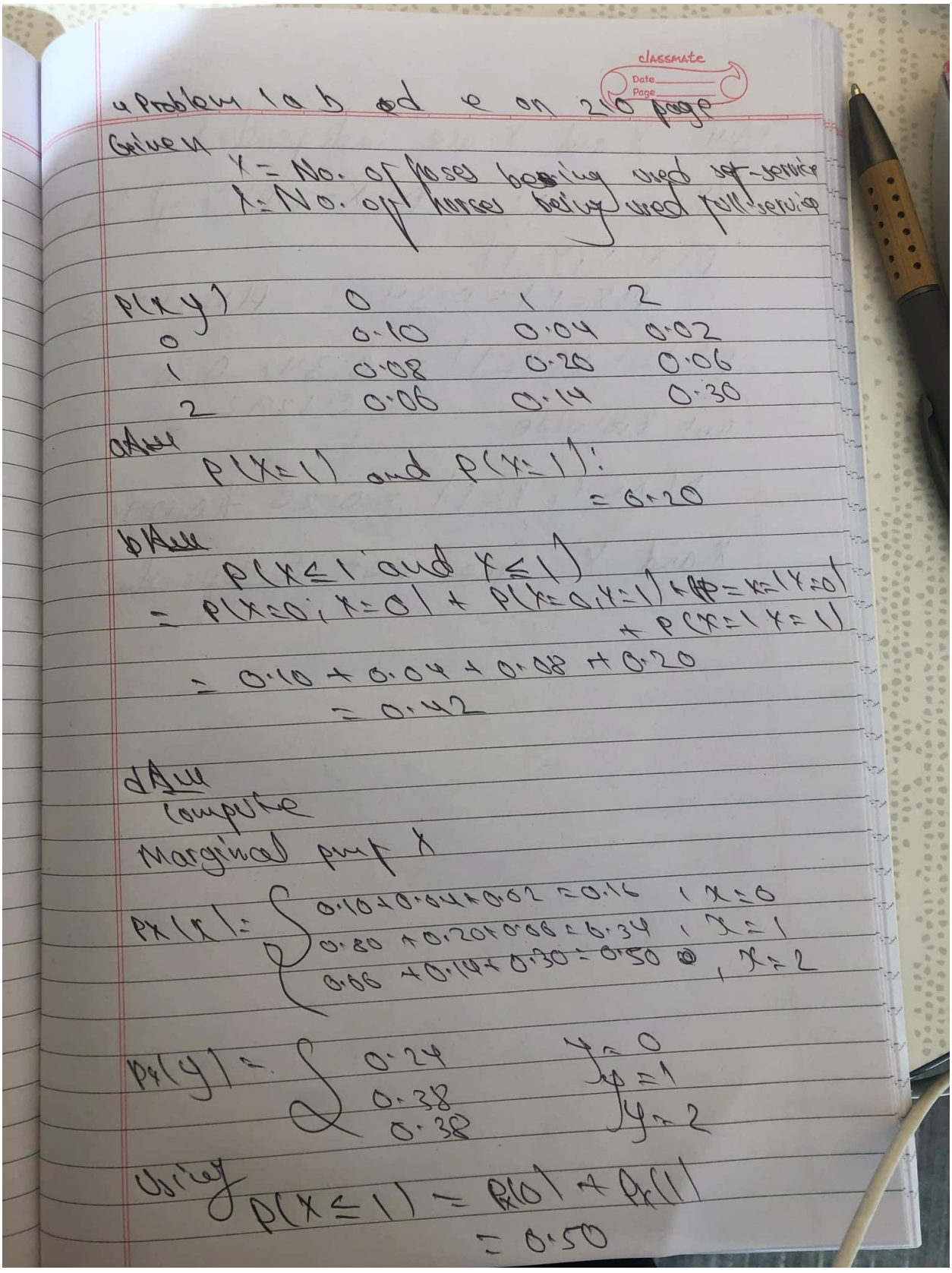
b) 75th percentile

$P(Z \leq z) = 075$

$z \approx 0.674$

$X = \mu + z\sigma = 30 + (0.674)(7.8)$

$X \approx 35.26\,mm$



Problem 1 a b and c on 210 page

Given

X = No. of buses having used self-service
Y = No. of buses having used full service

P(x,y)	0	1	2
0	0.10	0.04	0.02
1	0.08	0.20	0.06
2	0.06	0.14	0.30

a) Ans

P(X=1) and P(Y=1):

= 0.20

b) Ans

P(X≤1 and Y≤1)

= P(X=0, Y=0) + P(X=0, Y=1) + P(X=1, Y=0) + P(X=1, Y=1)

= 0.10 + 0.04 + 0.08 + 0.20

= 0.42

c) Ans

Compute

Marginal pmf X

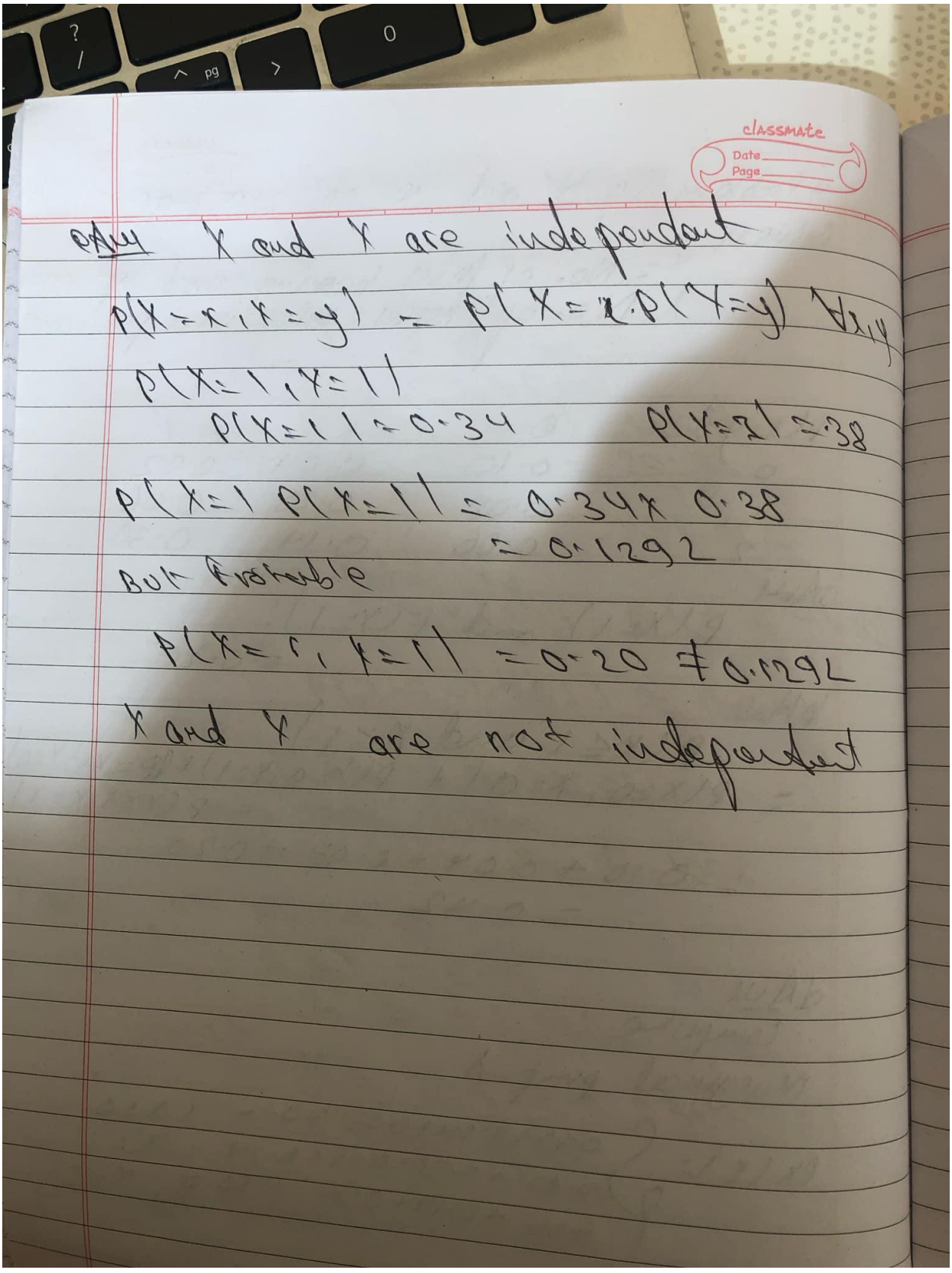
$$P_X(x) = \begin{cases} 0.10+0.04+0.02 = 0.16 & , x=0 \\ 0.80+0.20+0.06 = 0.34 & , x=1 \\ 0.06+0.14+0.30 = 0.50 & , x=2 \end{cases}$$

$$P_Y(y) = \begin{cases} 0.24 & y=0 \\ 0.38 & y=1 \\ 0.38 & y=2 \end{cases}$$

Using

P(X≤1) = P(0) + P(1)

= 0.50



classmate
Date
Page

Why X and Y are independent

$P(X=x, Y=y) = P(X=x) \cdot P(Y=y) \quad \forall x, y$

$P(X=1, Y=1)$

$P(X=1) = 0.34$ $P(Y=1) = .38$

$P(X=1) P(Y=1) = 0.34 \times 0.38$

$= 0.1292$

But Probable

$P(X=1, Y=1) = 0.20 \neq 0.1292$

X and Y are not independent