Problem 1:

a) Type of distribution → Probability

Binomial distribution → Because there is a probability of an event occuring several times over a number of trials.

b). Random variable X.

X – the population in the United State that has been fully vaccinated against COVID-19.

c) Values of X

0, 1, 2, . . . , 32.

d) identifying n, p and q.

$n = \underline{\underline{32}}$

$p = \frac{19.2}{100} = \underline{\underline{0.192}}$

$q = 1 - 0.192 = \underline{\underline{0.808}}$

e.)

Binomial probability $p(X=x) = < 0.000001$ or $0.000$

Cumulative probability $p(X<x) = > 0.999$ or $1.000$

Cumulative probability $p(X \le x) = > 0.999$ or $1.000$

Cumulative probability $P(X>x) = < 0.000001$ or $0.000$

Commulative probability $P(X \ge x)$ $< 0.000001$ or $0.000$

Problem 2:

a)

| $X$ = Number of classes in which a student is enrolled | $P(X)$ = probability to nearest hundredth |
|---|---|
| 1 | 0.0017 |
| 2 | 0.0016 |
| 3 | 0.0025 |
| 4 | 0.0038 |
| 5 | 0.0004 |
| Total | 0.01 |

b) ~~YES~~ NO because it does not describe all the possible values and likelihood that a random variable can take within a given range. that is if the students are not in clas, their are in either of all the other classes.

c)

$1 - \cancel{0.0017}\ 0.17 = 0.83$

$1 - 0.16 = 0.84$

$1 - 0.25 = 0.75$

$1 - 0.38 = 0.62$

$1 - 0.04 = 0.96$

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d) Probability to failure is higher than that of success.

Problem 3.

a) Uniform Distribution

b) $P(7 \le x \le 10)$

$$P(c \le x \le d) = (d - c)\left(\frac{1}{b-a}\right)$$

$$P(7 \le x \le 10) = (10 - 7)\left(\frac{1}{15-5}\right)$$

$$= 3 \times \frac{1}{10}$$

$$= \frac{3}{10} \text{ or } 0.3$$

c) $P(x \geq 12)$

$$P(x \geq x) = (b - x)\left(\frac{1}{b-a}\right)$$

$$P(x \geq 12) = (15 - 12)\left(\frac{1}{15-5}\right)$$

$$= 3 \times 1/10$$

$$\frac{3}{10} \text{ or } 0.3$$

d] $P(x = 9)$

$f(x) = \frac{1}{(b-a)}$

$f \quad \frac{1}{15-9} = \frac{1}{6}$

$\frac{1}{6}$

e] $P(x \leq 8)$

$(P(x \leq 8) = (8-5) \frac{1}{(15-5)}$

$3 \times \frac{1}{10}$

$\frac{3}{10}$ or $0 \cdot 3$

Problem 4:

a) Z - score 2 . dp $x = 71$

when $\mu = 65$ and $\sigma = 12$

$$Z = \left(\frac{x - \mu}{\sigma}\right) =$$

$$= \frac{71 - 65}{12} = \frac{6}{12}$$

$$= 0.5$$

from the table 0.5

$$= 0.3085$$

$$= \underline{\underline{0.31}}$$

b) Z - score of -1.8

$$x = Z\sigma + \mu$$

$$-1.8 = 0.03593$$

$$X = 0.03593 \times 12 + 65$$

$$= \underline{\underline{65.43}}$$

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$-1.8 \times 12 + 65 = \underline{\underline{43.40}}$

$\boxed{c}$ $x = 89$

$X = Z\sigma + 4$

$$\sigma \times Z = \frac{X-4}{\cancel{\sigma}} \times \cancel{\sigma}$$

$$\frac{Z\sigma}{Z} = \frac{X-4}{Z}$$

$$\sigma = \frac{X-4}{Z}$$

$$Z = \frac{89-65}{12}$$

$$= \frac{24}{12} = 2$$

$$= 0.0228$$

$\sigma$

$Z = -1.8$

$$\sigma = \frac{89-65}{Z}$$

$$= \frac{89-65}{0.0228}$$

$$= 1053$$

$\sigma = \sqrt{1053}$

$= 32$

$32 - 12$

$= \underline{\underline{20}}$

d] $x = 68$

To the right

e] $p(x < 60)$

$\cancel{p(X < x)} = \cancel{(x-a)}\left(\frac{1}{\cancel{b-a}}\right)$

$Z = \frac{60-65}{12} =$

$= \frac{-5}{12}$

$= -0.41667$

$= -0.42$

$p(z < -0.42)$

From the table

$\underline{0.3372}$ or $\underline{33.72\%}$

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Problem 5: Mean = 43 minutes $\sigma$ = 12 minutes

a) $P(x > 35)$

$$z = \frac{(x - \mu)}{\sigma}$$

$$z = \frac{35 - 43}{12}$$

$$= \frac{-8}{12} =$$

$$= -0.666$$

$$= -0.67$$

from the table

0.25143

$= 0.251$ or $25.1\%$

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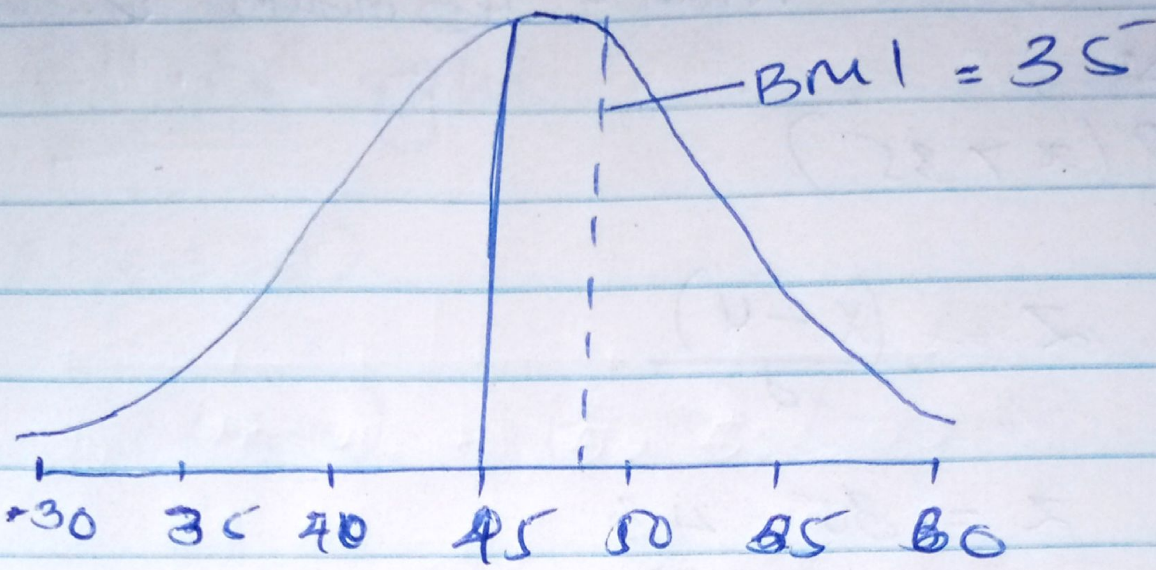
b)




c] $\sigma = 1.3$

$$z = \left(\frac{x - \mu}{\sigma}\right)$$

$$X = z\sigma + \mu$$

$$X = \cancel{0.251}\,{-0.67} \times 1.3 + \cancel{4}43$$

$$-2.881$$

$$\cancel{0.326}2 + 43$$

$$= 40.119$$

40 minutes

d] $x = 72$

$$z = \left(\frac{x - \mu}{\sigma}\right)$$

$$\sigma = \frac{x - \mu}{z}$$

$$\frac{72 - 43}{0.2514} = 1$$

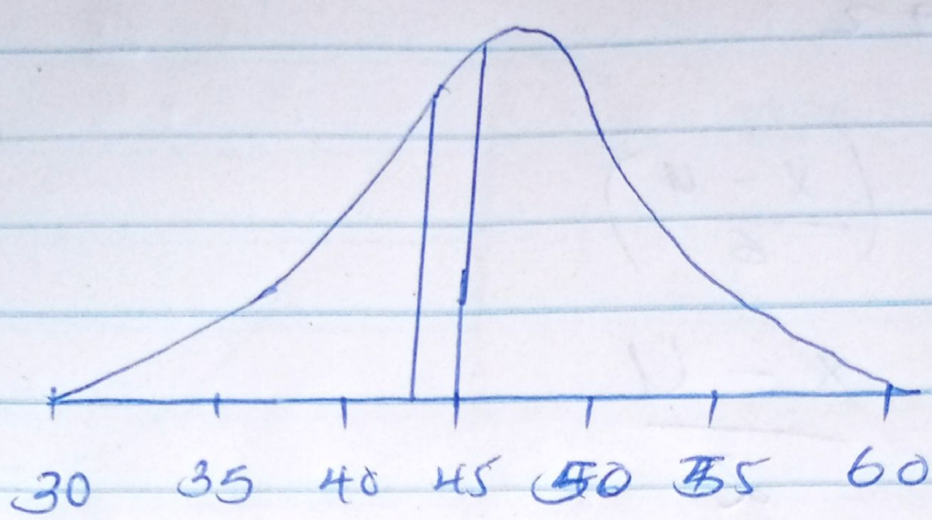
$$\sigma = \sqrt{115.35}$$

$$= 10.74$$

$$= 10$$

$$= 0.11$$

$\boxed{e}$




$\boxed{f}$ $P(47 < x > 60)$

$$Z = \frac{(X - u)}{6}$$

$$= \left(\frac{47 - 43}{12}\right)$$

0.33

$x = Z6 + u$

0.3707

$= \cancel{0.33} \times 12 + 43$

47.4484~~46.96~~

$$\frac{60 - 43}{12}$$

$= 1.42$

0.0778

$\cancel{1.42} \times 12 + 43$

$= \cancel{56.4}2$

43.9336

47.4484 − 43.9336

$0.3707 - 0.0778 = \underline{\underline{0.2929}}$

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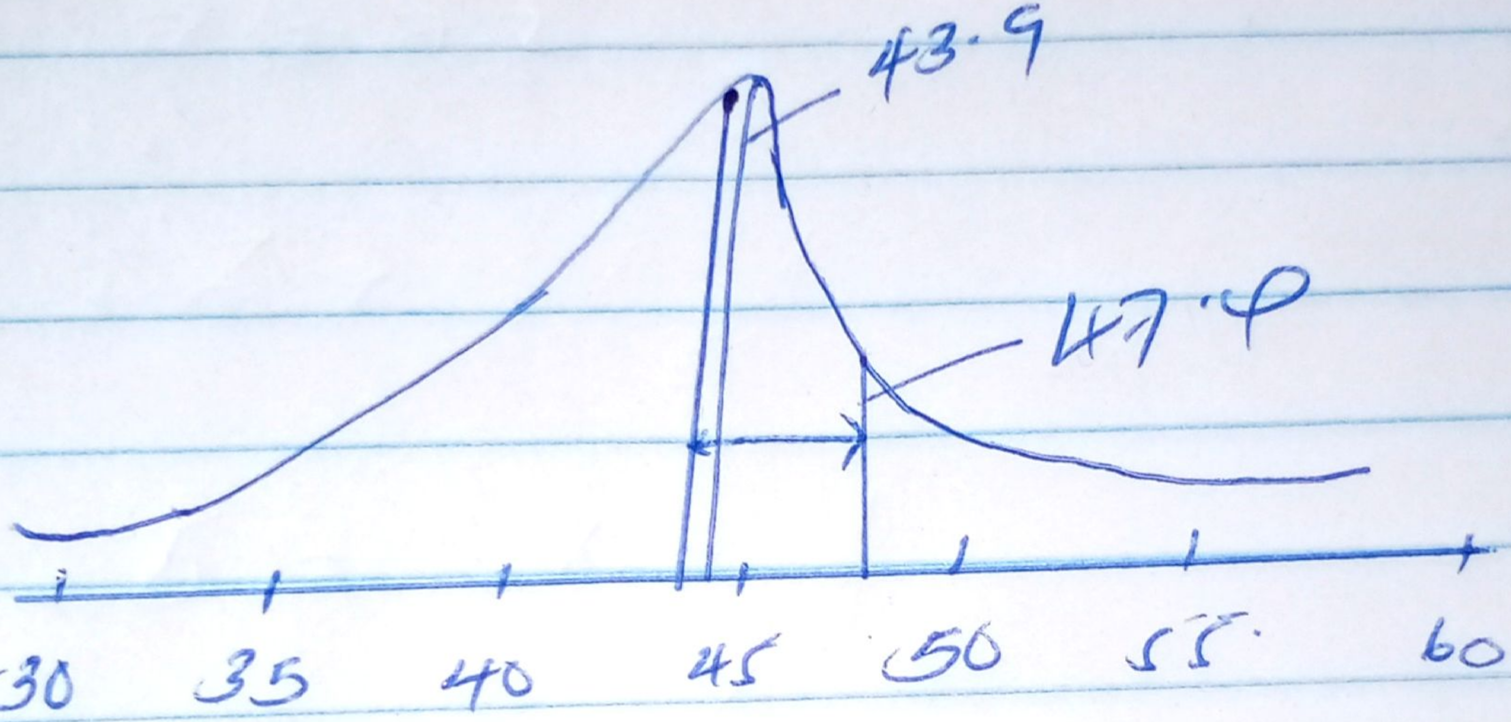
(9)

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