DAMT

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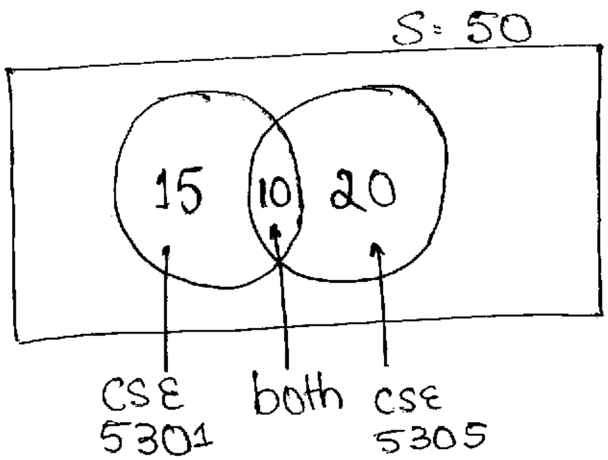
(1) Sample space has 50 student

15 → took CSE - 5301

20 → took CSE - 5305

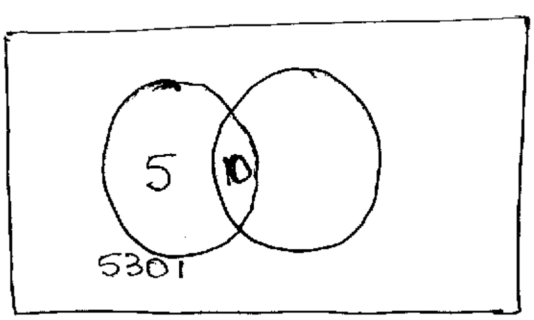
10 → took both



a) Student who took ether class

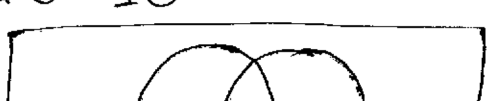
Number of student in only 5301 class

= 15 - 10 = 5 student



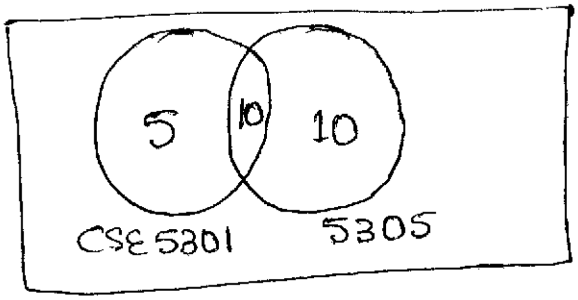
Number of student in Only 5305 class

= 20 - 10 = 10 student



So the total No of student who are in CSE 5301, 5305 and both are

$10 + 5 = \boxed{15}$

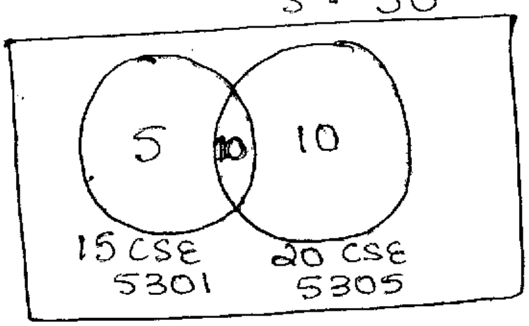


∴ 15 ~~25~~ students are in ether class

(b) Number of student who are in neither class

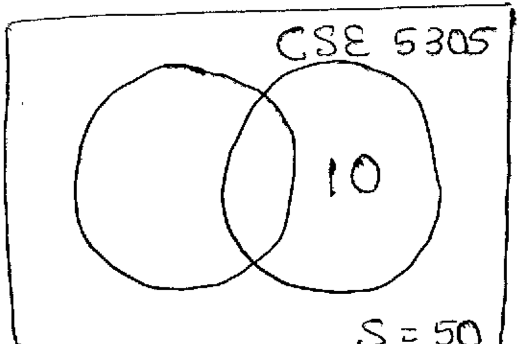
$50 - 25 = 25$ student

S = 50



(c) Probability that the student choose 5305

$= \frac{10}{50} = 0.2 = \boxed{20\%}$



2) (a) The total number of Sample space is

$$S = \{123, 124, 125, 213, 214, 215, 312, 245, \ldots\}$$

we have a total of $\boxed{60}$ element in sample space

(b) $S = \{RR, BB, RBRR, RBB, BRBRBB \ldots\}$

3) Binomial distribution =

$$P(x) = \frac{n!}{x!(n-x)!} p^x q^{(n-x)}$$

so, $n = 5$, (as we toss the coin 5 time)

$x = 2$ (head)

$P(\text{head}) = 1/2$ (Probability of head)

$q(\text{tail}) = 1/2$

Substituting in formula

$$P(x) = \frac{5!}{2!(5-2)!} p^2 q^{(5-2)}$$

$$= \frac{5!}{2!(5-2)!} \left(\frac{1}{2}\right)^2 \left(1/2\right)^3 = \boxed{\frac{10}{32}} = \boxed{0.3125}$$

(b) for a ~~1th~~ flip probability of getting head or tail is $1/2$.

so for 5 flip $= [1/2]^5 = \frac{1}{32}$

$\therefore$ probability of getting atleast 1 tail is

$1 - 1/32 = \boxed{\frac{31}{32}}$

(4) $P(D) = 0.0001$

$P(\sim D) = 1 - 0.0001 = 0.9999$

$P(K|D) = 1$

$P(T|D) = 0.95$

$P(\sim T|D) = 0.05$

$P(T|\sim D) = 0.01$

$P(\sim T|\sim D) = 0.99$

Applying Bayes

$$P(D|T) = \frac{P(T|D) \cdot P(D)}{P(T|D) \cdot P(D) + P(T|\sim D) \cdot P(\sim D)}$$

$$= \frac{(0.95)(0.0001)}{(0.95)(0.0001) + (0.01)(0.9999)}$$

$= 9.41153 \times 10^{-3} = \boxed{0.009411}$

• Since the Value is close to zero. The test is $\boxed{\text{not reliable}}$

4b) Let $P(K) = P(K|D) * P(D) + P(K|\sim D) * P(\sim D)$

$P(K|C,D) = P(K|C,\sim D) = 0.05$

so $P(\sim K|C,D) = 0.95$

The probability of being killed given the test is positive & we do not take the cure

$P(K|T \sim C) = P(K|T \sim C\ D) * P(D|T,\sim C) + P(K|T,\sim C,\sim D) \times P(\sim D|T,\sim C)$

T is conditionally independent as kill donot depend on test

$P(K|T,\sim C,D) = P(K|\sim C,D) = 1$

$P(K|T,\sim C,\sim D) = P(K|\sim C,\sim D) = 0$

$\therefore P(K|T,C) = P(K|T,C,D) * P(D|T,C) + P(K|T,C,\sim D) * P(\sim D|T,C)$

$= P(K|D,C) * P(D|T) + P(K|C,\sim D) * P(\sim D|T)$

$P(D|T)$: $0.95 * 0.0001 \,|\, (0.95 * 0.0001 + 0.01 * 0.9999) \cong 0.009411$

. $P(K|T,\sim C) = 0.009411$

. $P(K|T,C) = 0.05 * 0.009411 + 0.05 * 0.990589$

$= 0.05$

$\therefore$ The Value says we should not get treated.