Rocky Evidence hat 109480099

1. A $P(1) = 1/10$ $P(4) = 1/10$
$P(2) = 1/10$ $P(5) = 1/10$
$P(3) = 1/2$ $P(6) = 1/10$

$$\frac{1 - P(3)}{5} = P(1), P(2), P(4), P(5), P(6) = \boxed{1/10}$$

B. $P(\text{Doubles}) = \boxed{1/2}$

C. Dice rolls that add up to 7 are
$(6,1), (5,2), (4,3), (3,4), (2,5), (1,6)$

for each one it's $1/6 \cdot 1/10 = 1/60 \cdot 6 =$
$1/60 \cdot 6 = 6/60$ or $\boxed{1/10}$
↑ sum of our cases

2. $P_a(0) = .52$ $\quad P_a(1) = .48$

$P_a(0)^5 \cdot P_a(1)^2 = .52^5 \cdot .48^2 = .00876$

How many different ways can 5 0's and 2 1's be sorted?

Combinations

$$C(7,5) = \frac{7!}{5!(7-5)!} = 21$$

$21 \cdot .00876 = .18396 \cdot 100 = \boxed{18.396\%}$

B. Machine A

$P_a(00110) = .52 \cdot .52 \cdot .48 \cdot .48 \cdot .52 = .03239$

$.03239 \cdot 100 = \boxed{3.239\%}$

$P_a(1001) = .48 \cdot .52 \cdot .52 \cdot .48 = .06230 \cdot 100 = \boxed{6.230\%}$

Machine B

$P_B(00110) = 1 \cdot .39 \cdot .61 \cdot .39 \cdot .61 = .05659 \cdot 100 =$

$= \boxed{5.659\%}$

$P_B(1001) = 0\%$, Machine B always outputs 0 first

3. $R = \{(1,1),(1,2),(2,3),(3,1),(3,4),(4,2)\}$
on set $\{1,2,3,4\}$

$R^2 = R \cdot R = R^2 = R \cdot R$

$R \cdot R = R^2$

R	1	2	3	4
1	1	1	0	0
2	0	0	1	0
3	1	0	0	1
4	0	1	0	0

$\cdot$

1	1	0	0
0	0	1	0
1	0	0	1
0	1	0	0

$=$

1	1	0	0
0	0	1	0
1	0	0	1
0	1	0	0

$\cdot$

1	1	0	0
0	0	1	0
1	0	0	1
0	1	0	0

$=$

1	1	1	0
1	0	0	1
1	2	0	0
0	0	1	0

so $R^2 = \{(1,1),(1,2),(1,3),(2,1),(2,4),(3,1),(3,2),(4,3)\}$

$R^3 = R^2 \cdot R$

$R^2 \cdot R = R^3$

1	1	1	0
1	0	0	1
1	2	0	0
0	0	1	0

$\cdot$

1	1	0	0
0	0	1	0
1	0	0	1
0	1	0	0

$=$

2	1	1	1
1	2	0	0
1	1	2	0
1	0	0	1

so $R^3 = \{(1,1),(1,2),(1,3),(2,1),(2,4),(3,1),(3,2),(4,3)\}$

$R^4 = R^3 \cdot R$

R^3

2	1	1	1
1	2	0	0
1	1	2	0
1	0	0	1

$\cdot$

1	1	0	0
0	0	1	0
1	0	0	1
0	1	0	0

$=$

3	3	1	1
1	1	2	0
3	1	1	2
1	2	0	0

3. Cont. So $R^4 = \{(1,1),(1,2),(1,3),(1,4),(2,1),(2,2)$
$(2,3),(3,1),(3,2),(3,3),(3,4)$
$(4,1),(4,2)\}$

4. Primary key should be social security numbers because each one is unique for every person born. Therefore, no two people can have the same SSN.

Composite key I would choose name and date of birth. Because this is a record of people living in one neighborhood, multiple people likely live at the same address. These two keys can likely make it easy to identify one person.

5. Show S_3 is Reflexive, Symmetric, and transitive
If S_3 relation on Set R defined by $_x S_y$
If and only if $x-y$ is an integer

Reflexive
Because $x \in R$ then $x-x=0$, 0 is an integer. $\therefore {}_x S_x$ True.

Symmetric Two ways, Show ${}_y S_x$
If we suppose $x, y \in R$ and ${}_x S_y$ then $x-y=-(y-x)$, and $x-y$ is an integer so $y-x$ is also an integer, so ${}_y S_x$ True

5. Cont

Therefore show x, y, z show $x \mathcal{S} z$

If we suppose $x, y \in \mathbb{R}$, $x \mathcal{S} y$ and $y \mathcal{S} z$

Then $x-y$ = integer and $y-z$ = integer.

$\therefore (x-y)+(y-z) = x-z$ = integer also so $x \mathcal{S} z$ true.

Therefore $\mathcal{S}$ is an equivalence relation on $\mathbb{R}$

6. If $\mathcal{R}$ and $\mathcal{S}$ are both ^ anti symmetric

$A = \{A, B, C\}$

A. Then $(\mathcal{R} \cup \mathcal{S})$ is also anti symmetric

Suppose $\mathcal{R} = \{(a,b),(b,b),(c,a)$ and $\mathcal{B} = \{(a,b),(a,c)\}$ both are anti symmetric

Then...

$(\mathcal{R} \cup \mathcal{S}) = \{(a,c),(c,a)\}$ which is not anti symmetric.

$\therefore$ False

B. Then $(\mathcal{R} \cap \mathcal{S})$ is also anti symmetric

Suppose $(a,b),(b,a) \in \mathcal{R} \cap \mathcal{S}$

Then $(a,b),(b,a) \in \mathcal{R} \Rightarrow a = b$

$\therefore \mathcal{R} \cap \mathcal{S}$ is also anti symmetric

True.