Company Name — VERDIS

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Q Problem - 17 (SEND MORE MONEY)

$$\begin{array}{r} S\ E\ N\ D \\ +\ M\ O\ R\ E \\ \hline M\ O\ N\ E\ Y \end{array}$$

Solve if each letter is a distinct digit ($M \neq 0$ and the solution is unique).

$$\begin{array}{|r|l} \hline & SEND \\ + & MORE \\ \hline M & ONEY \\ \hline \end{array}$$

→ Since the resulting sum is a 5 digit number, and $9999 + 9999 < 20000$, we can conclude $M = 1$

M=1

$$\begin{array}{|r|l} \hline S & END \\ + 1 & ORE \\ \hline 1\ 0 & NEY \\ \hline \end{array}$$

Since $999 + 999 < 2000$, column 3 either gives 0 carry over, or gives 1.

$S+1 = 10+O \Rightarrow S = 9+O$

Since S is a single digit,

we must have $O = 0$ or $O = 1$.

$1+S+1 = 10+O \Rightarrow S = 8+O$

Since $M = 1$, we must have

$O = 0$.

$$\begin{array}{r} S\ E\ N\ D \\ +\ 1\ 0\ R\ E \\ \hline 1\ 0\ N\ E\ Y \end{array}$$

$M = 1$

$O = 0$

→ Since $E \neq N$, we cannot have $E+0 = N$.

We must have $1+E = N$.

(There must be carryover from column 2)

Since $N \neq 0$, we must have $E < 9$.

Consequently, column 3 cannot produce any carryover.

$S+1 = 10 \Rightarrow S = 9$

→

$M = 1$

$O = 0$

$S = 9$

$$\begin{array}{r} 9\ E\ N\ D \\ +\ 1\ 0\ R\ E \\ \hline 1\ 0\ N\ E\ Y \end{array}$$

Since $E \neq N$, we can not have $E + 0 = N$, we must have $1 + E = N$.

(There must be carryover from Column 2).

$N + R = 10 + E \Rightarrow 1 + E + R = 10 + E \Rightarrow R = 9$

$1 + N + R = 10 + E$

(But $R \neq 9$ since $S = 9$)

$1 + N + R = 10 + E \Rightarrow 1 + 1 + E + R = 10 + E$

$\Rightarrow R = 8$

(Note: there must be carryover from Column 2)

$\rightarrow$ $M = 1$

$0 = 0$

$S = 9$

$R = 8$

$$\begin{array}{r} 9\ E\ N \\ +\ 1\ 0\ 8 \\ \hline 1\ 0\ N\ E \end{array} \quad \boxed{\begin{array}{|c|} \hline D \\ E \\ \hline Y \\ \hline \end{array}}$$

(Note: there must be carryover from Column 1)

Since $Y \neq 0$ or 1, we must have $D + E \geq 12$.

Since D, E ≠ 8 or 9, we could have

7+5 = 12 or 7+6 = 13.

Either E = 7 or D = 7.

But if E = 7, then E+1 = 8 = N,

which is not possible

since R = 8.

So <u>D = 7,</u> and E = 5 or 6.

M = 1 D = 7

O = 0

S = 9

R = 8

	9	E	N	7
+	1	0	8	E
1	0	N	E	Y

E = 5 or 6

If E = 6, then E+1 = 7 = N, which

is not possible since <u>D = 7</u>

Hence <u>E = 5,</u>

and <u>E+1 = 6 = N</u>

And finally 7+E

= 7+5

= 12

<u>Y = 2</u>.

	9	E	N	7
+	1	0	8	E
1	0	N	E	Y

$\Rightarrow$ M=1 D=7

O=0 E=5

S=9 N=6

R=8 Y=2

$$\begin{array}{r} 9\ 5\ 6\ 7 \\ +\ 1\ 0\ 8\ 5 \\ \hline 1\ 0\ 6\ 5\ 2 \end{array}$$

Ans

Problem B (WEIGHING IN A HARDER WAY)

→ Separate the coins into 3 stacks of 9 (A, B, C).

→ Weight Stack A against B and then A against C.

→ Take the Stack with different weight. (Name lighter or heavier) and break it into 3 stacks of 3 (D, E, F).

→ Weight Stack D against E.

→ If D and E are Equal, the F is the odd stack.

→ If D and E are not equal, the lighter or heavier (based on the A, B, C Comparison) is the odd stack.

→ you now have three Coins (G, H, I).

→ Weight G and H. If G equals H, Then I is the odd and its lighter or heavier (based on the A, B, C Comparison). ~~If G and H are not Equal,~~

- If G and H are not equal, then the lighter or heavier (based on the A1B1C comparison) is the odd coin.

Problem-3 (1000 Wine Problem)

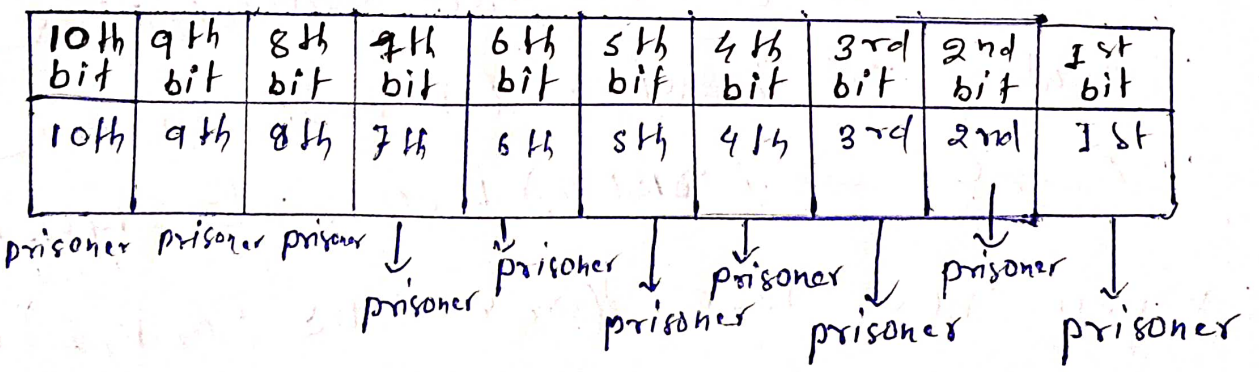
- Assign each prisoner as a placeholder in the binary numbers so formed.

Prisoner 1 is assigned binary place 1.

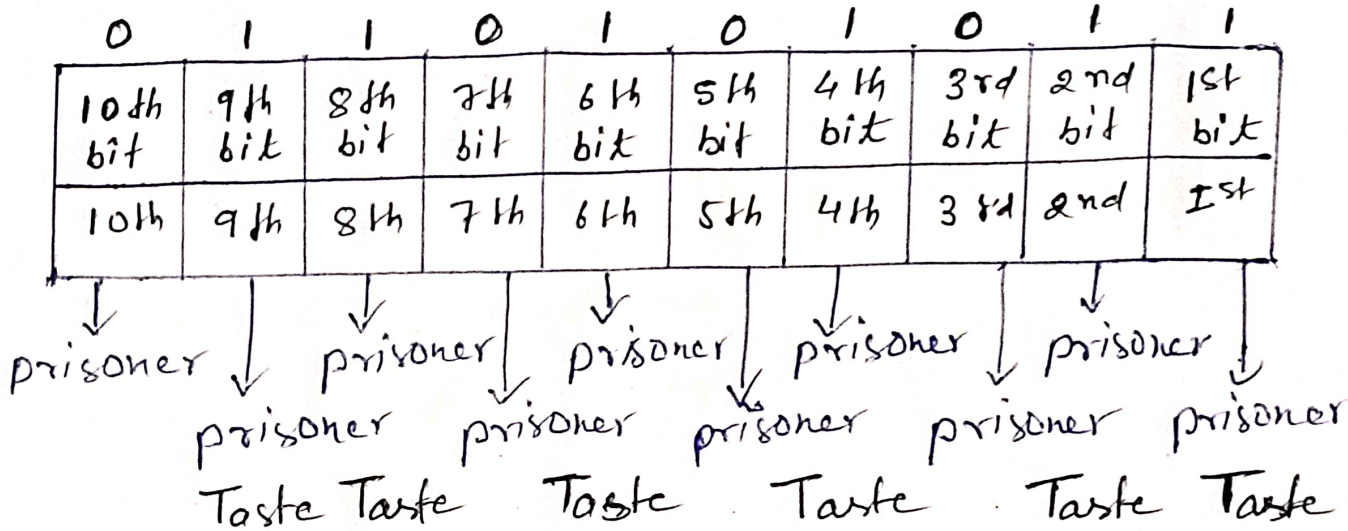
Prisoner 2 is assigned binary place 2.

Prisoner 3 is assigned binary place 3.

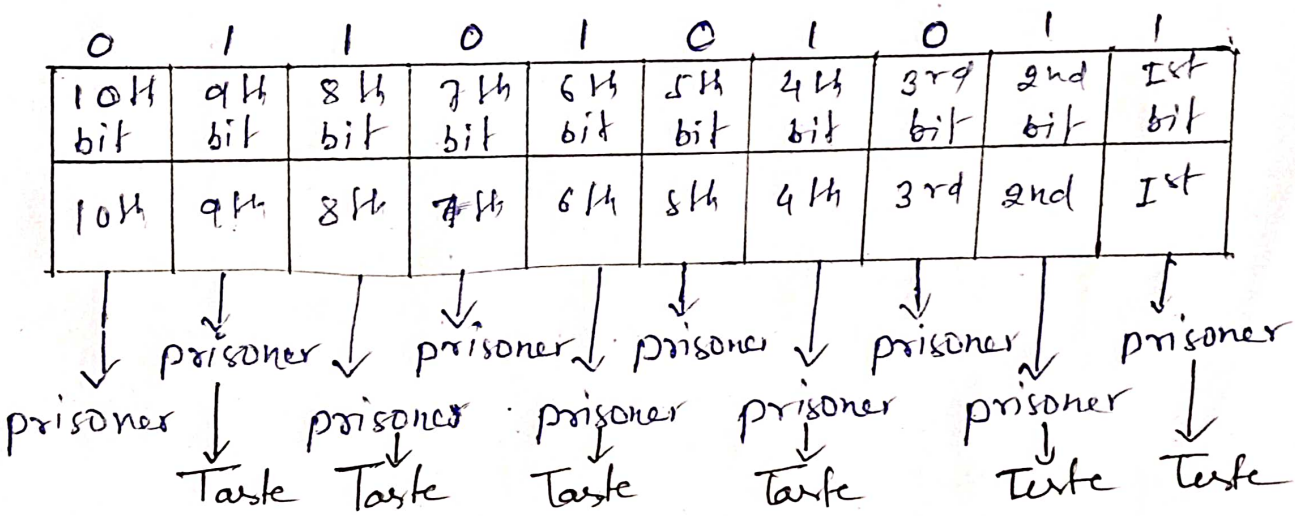
and so on...



- Each prisoner will taste the wine from the bottle if the number on the bottle at the binary place assigned to him is 1 otherwise if it is 0, he doesn't take a sip.
- Example consider the bottle number 427
- Binary form of 427 is: 0110101011



Wait for 24 hours



if 1st, 2nd, 4th, 6th, 8th, 9th prisoners died it means bottle no. 427 is prisoned.

- Consider another case when 3rd, 5th, 6th & 8th prisoners died. It means poisioned bottle would be :-

(10) (9) (8) (7) (6) (5) (4) (3) (2) (1)
0 0 1 0 1 1 0 1 0 0

0 0 1 0 1 1 0 1 0 0 = 180

Hence 180th bottle is poisioned.