

TITLE HERE

I - Math examples

1. Basic Proof

$(K_{12}, +)$ is a group simulating a 12-hour clock. It contains the whole numbers of a from 1 to 12 and the operation $+$ allows adding times together. For example, $11 + 10 = 9$. Prove that $A = \{5, 10, 15\}$ is a subgroup of $(K_{15}, +)$.

Proof:

| $+$ | 5 | 10 | 15 |
|-----|----|----|----|
| 5 | 10 | 5 | 10 |
| 10 | 15 | 5 | 10 |
| 15 | 5 | 10 | 15 |

$$g, h \in A \rightarrow gh \in A \quad \text{(Closure)}$$

$$15 * x = x * 15 = x, x \in K_{15} \text{ ja } 15 \in A \quad \text{(Identity element of K in A)}$$

$$5^{-1} = 10, 10^{-1} = 5 \text{ ja } 15^{-1} = 15 \quad \text{(Each element's } (\in A) \text{ inverse } \in A)$$

2. Matrices

$$\begin{bmatrix} 1 & 1 & -1 \\ 0 & -1 & 1 \end{bmatrix} * \begin{bmatrix} 1 & 1 \\ -1 & -1 \\ -1 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 1 * 1 + 1 * (-1) + (-1) * (-1) & 1 * 1 + 1 * (-1) + (-1) * 0 \\ 0 * 1 + (-1) * (-1) + 1 * (-1) & 0 * 1 + (-1) * (-1) + 1 * 0 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

3. Multicolumns

Prove that the operation \odot can't be defined in the set of rational numbers followingly:

$$\frac{m}{n} \odot \frac{k}{l} = \frac{m+k}{m^2+l^2}$$

Clearly $\frac{1}{1} = \frac{2}{2}$, however:

$$\begin{aligned}\frac{m}{n} \odot \frac{k}{l} &= \frac{m+k}{m^2+l^2} \\ &= \frac{1+1}{1^2+1^2} \\ &= \frac{2}{2}\end{aligned}$$

$$\begin{aligned}\frac{m}{n} \odot \frac{k}{l} &= \frac{m+k}{m^2+l^2} \\ &= \frac{2+2}{2^2+2^2} \\ &= \frac{4}{8}\end{aligned}$$

I - Code examples

4. Python code

```
from random import randint

def dice_probability_test(n):
    numbers = [0, 0, 0, 0, 0, 0]
    for i in range(1, n):
        number = randint(1,6)-1
        numbers[number] = numbers[number] + 1
    return numbers
```