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Assignment 1(Task 1-Task 8)

Task 1

The time complexity of the factorial function in Θ is Θ(n) with the respect to n.

Task2

Code re-implemented using recursive function call is as below:

```
def factorial(n):
    if n==0 or n==1:
        return 1
    else:
        return n*factorial(n-1)
```

Task 3

The time complexity of the factorial function in Θ is $\Theta(n^2)$.

Task 4

Given Matrices: $A=\begin{bmatrix} a & b \\ c & d \end{bmatrix}$, $B=\begin{bmatrix} e \\ f \end{bmatrix}$

Then,

$A*B=\begin{bmatrix} ae+bf \\ ce+df \end{bmatrix}$

Task 5

Given, $f(x)= 3x^2+5x-7$

Part a: $f'(x) = 6x+5$

Part b: $f'(5) = 6*5+5 = 30+5 = 35$

Part c: $f''(x) = 6$

Part d: $f''(5) =6$

Task 6

Given,

P(A) = 0.3 and P(B) = 0.6.

- P(A and B) = P(A)*P(B) = 0.3*0.6 =0.18
- P(A or B) =P(A) + P(B) = 0.3+0.6 =0.9
- P(not A) =1- P(A) = 1-0.3 =0.7
- P(A|B) = P(A) = 0.3 (Being independent events)

Task 7

Total number of hats = (40+70+35+15+50+30+60+20+80) =400

P(color=green) = (15+50+30)/400 = 0.2375

Part a: P(price < $75) = (hats with price less than $75)/ Total number of hats

= (40+70+15+50+60+20)/ 400

= 255/400

= 0.6375

Part b: P(price < $75 | color=green) = P(Price < $75 and color=green) /P(color=green)

$$= \frac{\frac{15+50}{400}}{0.2375}$$

= 0.1625/0.2375

= 0.6842

Part c: P(price<75, color=green) = P(price<75|color=green)*P(color=green)

= 0.6842*0.2375

= 0.1625

Task 8:

Given, 2 hen lays 2 eggs in 2 days.

With the same rate,

10 hen lays (2*5) eggs in 2 days. (As the number of hens are increased by 5 times)

10 hen lays (2*5*5) eggs in 10 days. (Number of hens and days are increased both by 5 times)

Therefore, 10 hen lays *50 eggs* in 10 days.