
Task 1

```
def factorial(n):
    result = 1
    for i in range(2, (n+1)):
        result = result * i;

    return result
```

The time complexity of this function is **Θ(n)** due to the function always iterating n-1 times.

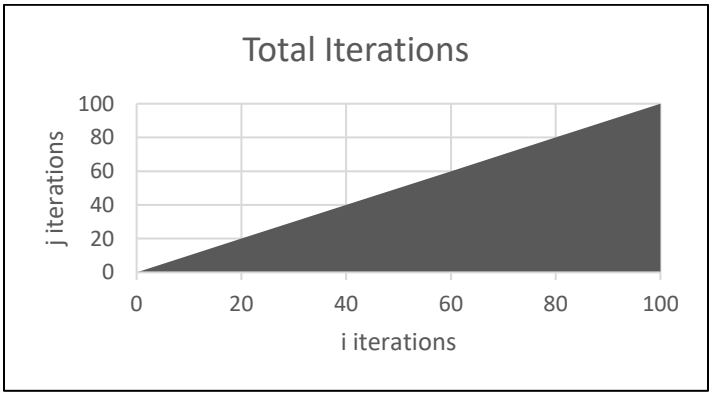
Task 2

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

Task 3

```
def foo(n):
    result = 0
    for i in range(1, n+1):
        for j in range(1, i+1):
            result = result + 1
    return result
```

The time complexity of this function is **Θ(n^2)** because i is used to iterate through n and j is used to iterate through i. This result has a time complexity similar to ½n^2 which results in Θ(n^2).



Task 4

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} * \begin{bmatrix} e \\ f \end{bmatrix} = \begin{bmatrix} \boldsymbol{ae + bf} \\ \boldsymbol{ce + df} \end{bmatrix}$$

Task 5

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

a. f'(x) = **6x+5**

b. f'(5) = 6(5)+5 = **35**

c. f''(x) = **6**

d. f''(5) = **6**

Task 6

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

a. f_x = **6xy + 5**

b. $f_x(5,2)$ = 6(5)(2)+5 = **65**

Task 7

- P(A and B) = 0.3 * 0.6 = **0.18**
- P(A or B) = 0.3 + 0.6 – 0.18 = **0.72**
- P(not A) = 1.0 – 0.3 = **0.7**
- P(A|B) = **0.3** because they are independent

Task 8

Color	Price $20 to $40	Price $50 to $70	Price $80 to $100
Red	40	70	35
Green	15	50	30
blue	60	20	80

a. P(price < $75) = (70+50+20+40+15+60)/400 = **0.6375**

b. P(price < $75 | color=green) = (15+50)/95 = **0.6842**

c. P(price < 75, color=green) = (15+50)/400 = **0.1625**

Task 9

> Two hens lay a combined total of two eggs in two days. If this rate of egg production per hen per day continues, how many eggs do ten hens lay in ten days?

H=Hen, E=Egg, D=Day

2H = 2E/2D so 10H = ?E/10D

10H = 10E/2d

10H = 50E/10D

Ten hens lay **50 eggs** in ten days.

Task 10

Completed in the file file_stats.py

Task 11

Completed in the file nth_smallest.py

Task 12

> "I really, really need an extension, I have three midterms this week, I do not have time to work on the homework. My homework average is already close to 60, I am afraid of failing the class."

a. The student can expect **B or C**. I don't know how verbose you are in your emails but C is almost word for word from the syllabus

b. The student can still expect **B or C**. I don't know how verbose you are in your emails but C is almost word for word from the syllabus

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Task 13

> "For assignment X, can I use library Y? That library already seems to implement what you are asking."

The student can expect **C.** Use at your own risk. The lectures have provided all the…
