DSC 40B - Discussion 01

Problem 1.

For each of the following pieces of code, state the time complexity using Θ notation.

a)
```python
def f_1(n):
    for i in range(1_000_000, n):
        for j in range(i):
            print(i, j)
```

b)
```python
def f_2(n):
    j = 0
    for i in range(n, n**5):
        while j < n:
            print(i, j)
```

c)
```python
def f_3(n):
    j = 1
    while j <= n:
        j = j * 2
```

d)
```python
def f_4(arr):
    """arr is an array of size n"""
    t = 0
    for i in range(n):
        t += sum(arr)

    for j in range(n**3):
        print(j//t)
```

Problem 2.

State the growth of the function below using Θ notation, and prove your answer by finding constants which satisfy the definition of Θ notation.

$$f(n) = \frac{n^3 - n^2 + n + 1000}{(n-1)(n+2)}$$

Problem 3.

Let $f(n) = \sum_{p=0}^{n} 3^p$. What is f in Θ notation?