

Assignment 1

COMP 4500

Due: January 19, 2024 before 11:59 p.m.

Upload your Word, PDF, or LaTeX file(s) to Blackboard

Exercises from the Textbook (60 points):

Page 22: 1, 2

Page 67: 1, 2, 3, 6

Notes:

- For Problem 1 on p. 67, divide the new time by the old time to determine how much slower.
- For Problem 2 on p. 67, assume $\log_{10}$ for part (d). You might want to write a short program to compute the answer for part (d) as well.

Additional Exercises (40 points):

1. Give the Big Theta running bound on the following Java code in terms of n .

```
int count1 = 0;
for (int i = 0; i*i < n; ++i)
    for (int j = 0; j*j < n; ++j)
        ++count1;
```

2. Give the Big Theta running bound on the following Java code in terms of n .

```
int count2 = 0;
for (int i = n; i > 0; i /= 2)
    for(int j = 0; j < n; ++j)
        ++count2;
```

3. Give the Big Theta running bound on the following Java code in terms of n .

```
int count3 = 0;
for (int i = 1; i <= n; i *= 2)
    for(int j = 1; j <= i; ++j)
        ++count3;
```

4. For what values of n is an algorithm that requires exactly $n^2/10$ operations take fewer operations than an algorithm that requires exactly $n \log_2 n$ operations? For partial operations, take the ceiling of the value, since a full operation is always required.

Extra Credit (10 points):

Page 67: 8(a)