CS 313, Intermediate Data Structures
Fall 2025

Assignment 2

due Friday, Oct 31, 2025

For complexity arguments, please explain your answers, but you don't need to do rigorous proofs with c and N for this assignment.

1. Exercise 3-2, p 61.

	A	B	O	o	Ω	ω	Θ
a.	$\lg^k n$	n^ϵ	?	?	?	?	?
b.	n^k	c^n	?	?	?	?	?
c.	$\sqrt{n}$	$n^{\sin n}$	?	?	?	?	?
d.	2^n	$2^{n/2}$	?	?	?	?	?
e.	$n^{\lg c}$	$c^{\lg n}$	?	?	?	?	?
f.	$\lg(n!)$	$\lg(n^n)$	?	?	?	?	?

[12 points]

2. Determine the run times of the following two pieces of code, which do pretty much nothing. Explain your reasoning. **[8 points]**

```
sum = 0
for i = 1 to n*n
     for j=1 to i*i
          sum++
```

and

```
sum = 0
for i = 1 to n^2
     j=i
     while j>0
          sum++
          j = (j div 5)
```

3. What is the running time for the following code, which multiplies two $n \times n$ matrices A and B, storing the result in C? Explain your reasoning. **[4 points]**

```
for i=1 to n
     for j=1 to n  {
          C[i,j] = 0
          for k=1 to n
               C[i,j] = C[i,j] + A[i,k]*B[k,j]
          }
```

4. Exercise 2-3, p 41. **[12 points]**

Total: 36 points