

## CS4321 Homework 2

Due on Tuesday, Oct. 2 at the beginning of class.

(78 points)

1. (10 points) Derive a big- $\Theta$  bound for the following algorithm. Show your work.

*Hint:* You can use the equations at Page 55 directly.

```
for (i = 1; i <= n*n; i++) {  
    j = i;  
    while (j > 0) {  
        j = j/2;  
    }  
}
```

2. (10 points) Derive a big- $\Theta$  bound for the following algorithm. Express your answer in the simplest possible form.

```
s = 0;  
for (i = 1; i <= n; i++)  
    for (j = 1; j <= i; j++)  
        for (k = j; k <= n; k++)  
            s++;
```

3. (8 points) Write an asymptotic recurrence equation that gives the time  $T(n)$  taken by a call of  $DC(n)$  below. You will be asked to solve this recurrence in the next assignment.

```
void DC(int n)  
{  
    if (n <= 1) return;  
  
    for (i = 0; i < 8; i++)  
        DC(n/2);  
  
    for (i = 0; i < n*n*n; i++)  
        constant work;  
}
```

4. (10 points) Problem 5.2-5, P. 99.  
5. (10 points) Problem 17.1-2, P. 409.

6. (10 points) Problem 17.1-3, P. 410.
7. (10 points) Problem 17.2-2, P. 412.
8. (10 points) Problem 17.3-2. P. 416.
9. (10 points, optional) Problem 17.2-3. P. 412.