**Santa Clara University**
**2021 Spring Midterm Exam**

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| Course | COEN279/AMTH377 | Name | |
| Department | Computer Engineering | Student ID | |
| Lecturer | Yuan Wang | Data/Time | 2021/04/28 7:10am - 8am |
| Format | open-book | | |
| Note | No discussion. No cell phone. | | |

1. [25 points] Prove: $6n^3 \neq \Theta(n^2)$

2. [25 points]、Find the complexity of the following program:

```
MyFunction(n) {
    i, j, k, count = 0
    for i = n/2; i<=n; i = i+1
        for j = 1; j + n/2 <=n; j = j+1
            for k =1; k<=n; k = k*2
                count = count + 1
}
```

3. [25 points]. An algorithm *A* solve the problem of size n by dividing into 9 subproblems of size n/3, recursively solving each subproblem and then combining the solutions in $\Theta(n^2)$ time. What is the time complexity of this algorithm?

4. [25 points] Given an array A of n numbers, where each entry is an ID (integer number) of an election candidate. Each entry represents one vote of a candidate (there might be multiple entries for one candidate in the array). Write an efficient linear algorithm (in pseudo code) to determine who won the election and give the complexity of your algorithm.


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