

**CS 5/7350**  
**Quiz #4 Due Mar 8 for Completion Grade**

Name & ID: \_\_\_\_\_

CS5350? Yes / No ☒

1. [2.5 pt] Consider two different algorithms that each solve a different problem.

- Implementation  $X$ ,  $I_x$ , solves Problem  $P_x$  and Implementation  $X$  is  $\Theta(n)$
- Implementation  $Y$ ,  $I_y$ , solves Problem  $P_y$  and Implementation  $Y$  is  $\Theta(2^n)$
- Implementation  $Z$ ,  $I_z$ , solves Problem  $P_z$  and Implementation  $Z$  is  $O(n^2)$

Determine if each of these "Yes it is true", "Maybe it is true but doesn't have to be", or "No it is not true"

- |                                    |   |
|------------------------------------|---|
| a. ____ $P_x$ is harder than $P_y$ | f. ____ Problem $X$ is $\omega(n)$        |
| b. ____ $P_y$ is harder than $P_x$ | g. ____ Problem $X$ is $O(n^3)$           |
| c. ____ $I_y$ is harder than $I_x$ | h. ____ Problem $X$ is $o(n^2)$           |
| d. ____ $I_z$ is harder than $I_x$ | i. ____ Implementation $Y$ is $\Omega(n)$ |
| e. ____ Problem $X$ is $\Omega(n)$ | j. ____ Implementation $X$ is $\omega(n)$ |

2. [2 pts] How many edges exist in:

- i A complete graph of  $|V|$  vertices
- ii A cycle of  $|V|$  vertices
- iii A Tree of  $|V|$  vertices
- iv A complete bi-partite graph  $B_{j,k}$  with  $j$  vertices on one part and  $k$  vertices on the other part.

3. [2 pts] Find an integer for  $n$  modulo 14635 that satisfies the following equation. Note that you may use the following:  $1/2793 \% 14635$  is 2047:

$$(2793n + 91) \% 14635 = 1374$$