

CSE 5/7350 Homework #1
Due September 12, 2018 at 5pm

Name: _____

ID: _____

1. [10 pt] Find C_1 and C_2 and n_0 to show that $5x^2 + 4x - 8320$ is $\Theta(n^2)$
2. [10 pt] An algorithm can process 512 items in 2 seconds.
 - a. About how long would it take to process 6144 items if the algorithm is $\Theta(n^2)$?
 - b. About how long would it take to process 6144 items if the algorithm is $\Theta(n)$?
 - c. About how long would it take to process 6144 items if the algorithm is $\Theta(n^3)$?
 - d. About how long would it take to process 6144 items if the algorithm is $\Theta(2^n)$?
 - e. About how long would it take to process 6144 items if the algorithm is $\Theta(n^{1/2})$?
3. [20 pts] Write a program that accepts an integer “n” as input. The program should then
 - a. Create an array of size “n” with random numbers between the values of 1 and 10 (inclusive).
 - b. Print the number of times each value 1-10 is in the array.

What is the running time your program for various values of “n”? Assuming you had enough memory, estimate the size of “n” you could process in 3 days.
(include your code, output, and answers to the questions)

4. [20 pts] Modify your program in #3 to sort the values in the array with either an insertion, selection or bubble sort. What is the running time your program for various values of “n”? Assuming you had enough memory, estimate the size of “n” you could process in 3 days.
5. [20 pts] Modify your program again to use the most efficient way you know to sort the numbers in this specific array. What is the running time your program for various values of “n”? Assuming you had enough memory, estimate the size of “n” you could process in 3 days.
6. [20 pts]]Given the following table, fill in all the other bounds you can based on the ones given.

Problem			Algorithm			Implementation		
Best	Average	Worst	Best	Average	Worst	Best	Average	Worst
				$\Omega(n)$	$O(n)$			
			$\Theta(n^2)$				$O(n^2)$	
$\Omega(n^2)$				$\Theta(n^2)$			$\Omega(n^2)$	