HW1

Due 1/20/23 by 11:59pm

To solve these problems, you are allowed to consult your classmates, as well as the class textbook (Algorithms by Dasgupta, Papadimitriou, and Vazirani, which we will call DPV) and notes, but no other sources. We encourage you to collaborate with other students, while respecting the collaboration policy. Please write the names of all the other students you collaborated with on the homework. Everyone must write up their assignments separately.

Q1. (20 points; 2per part) DPV Problem 0.1 (parts a and j)

Q2. (10 points) Consider the following pseudo-code which takes the integer $n \geq 0$ as input:

```
Function bar(n)
   Print '*';
   if n == 0 then
      Return;
   end
   for i = 0 to n – 1 do
      bar(i);
   end
```

Let T(n) be the number of times the above function prints a star (*) when called with input n ≥ 0. What is T(n) exactly, in terms of only n (and not values like T(n − 1) or T(n − 2))? Prove your statement.

Q3. (30 points) Let f(n) and g(n) be asymptotically nonnegative functions. Using the basic definition of θ-notation, prove that max(f(n),g(n))= θ(f(n)+g(n)).

Q4. (10 points; 5per part) (a) is $2^{2n}=O(2^n)$?; (b) why?

How to submit:

Your HW must be submitted in **PDF Format** to SUBMITTY. As noted above, you must mention upfront all students you collaborated with, but **all final work must be your own**.