

QUESTION 1: Polynomials & Exponentials

Today, your computer can do T steps in a week. According to [Moore's law](#), next year, your computer will be able to do $2T$ steps in a week. How does doubling T change the n that can be computed in a week?

a) If $T = n^2$, what does doubling T correspond to in terms of n ? In other words, by what arithmetic factor does n change when T doubles?

b) If $T = 2^n$, what does doubling T correspond to in terms of n ? In other words, by what arithmetic factor does n change when T doubles?

Important! Your answer should include an algebraic solution as well as the reasoning/logical steps - either in words or equations - by which you arrived at your answer. The latter will form a part of the exam grade.

QUESTION 2: Divide & Conquer

For the Towers of Hanoi puzzle, there is a function $f(n)$ that computes the total number of moves needed to move n disks. For $f(0) = 0$, but for n greater than 0, $f(n) = 2f(n-1)+1$.

Additionally:

n	0	1	2	3
$f(n)$	0	1	3	7

a) What is the function that allows the equation to be true?

b) What is $f(n)$ for $n = 64$?

Important! Your answer should include both an algebraic solution (the identity of function f) as well as a numeric solution, solving for $n=64$.

The questions correspond to the [Polynomials & Exponentials \(QUESTION 1\)](#) and [Divide & Conquer \(QUESTION 2\)](#) Quizzes, where you can find more information.

Download the video quizzes [here](#).