COMP 3804 — Background Quiz

- The purpose of this background quiz is for you to find out if you are ready for this course.

- You do not submit the quiz and do not get marks for it.

- If you cannot answer most of these questions, then you should review COMP 1805 and COMP 2804.

Question 1 What is $\log_2 128$?

Question 2 Let S be a set of size n. How many subsets does S have?

Question 3 What is the best time complexity to sort any sequence of n numbers?

Question 4 What is the best time complexity to search for any number x in a sorted array of n numbers?

Question 5 You are given a sorted sequence of n numbers. What is the best time complexity to construct a binary search tree for these numbers?

Question 6 What is the sum of the series $\sum_{k=1}^{n} k$?

Question 7 Solve the following recurrence: $T(1) = 1$ and for each $n \geq 2$ that is a power of two, $T(n) = 2 \cdot T(n/2) + n$.

Question 8 Solve the following recurrence: $T(1) = 1$ and for each $n \geq 2$ that is a power of two, $T(n) = T(n/2) + 1$.

Question 9 Let G be a graph with n vertices and n edges. Can G be a tree?

Question 10 Let G be a graph with n vertices. What is the maximum number of edges that G can have?

Question 11 You are given two sorted lists, each containing n numbers. What is the best time complexity to merge these two lists into one sorted list?

Question 12 What is a random variable? (*Hint:* A random variable is neither random nor a variable.)

Question 13 You roll a fair die repeatedly until the result is 3. Let X be the number of rolls. What is the expected value of X?