



# HABIB UNIVERSITY

## Data Structures & Algorithms

CS/CE 102/171 Spring 2023

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### Time Complexity of Recursive Functions – Master's Theorem

Student Name: \_\_\_\_\_

**Q1)** Use the relevant Master's Theorem to deduce the time complexity of the following recurrence relation:

$$T(n) = \begin{cases} T(n-2) + 1 & , n > 0 \\ 1 & , n = 0 \end{cases}$$

**Q2)** Use the relevant Master's Theorem to deduce the time complexity of the following recurrence relation:

$$T(n) = \begin{cases} T(n-1) + \log n & , n > 0 \\ 1 & , n = 0 \end{cases}$$

**Q3)** Use the relevant Master's Theorem to deduce the time complexity of the following recurrence relation:

$$T(n) = \begin{cases} 9T(n-1) + 5 & , n > 0 \\ 1 & , n = 0 \end{cases}$$

**Q4)** Use the relevant Master's Theorem to deduce the time complexity of the following recurrence relation:

$$T(n) = \begin{cases} 5T(n-4) + 10 & , n > 0 \\ 1 & , n = 0 \end{cases}$$

**Q5)** Use the relevant Master's Theorem to deduce the time complexity of the following recurrence relation:

$$T(n) = \begin{cases} 3T(n-5) + n! & , n > 0 \\ 1 & , n = 0 \end{cases}$$

**Q6)** Use the relevant Master's Theorem to deduce the time complexity of the following recurrence relation:

$$T(n) = \begin{cases} T(n/3) + 5 & , n > 1 \\ 1 & , n = 1 \end{cases}$$

**Q7)** Use the relevant Master's Theorem to deduce the time complexity of the following recurrence relation:

$$T(n) = \begin{cases} T(n/3) + n^2 & , n > 1 \\ 1 & , n = 1 \end{cases}$$

**Q8)** Use the relevant Master's Theorem to deduce the time complexity of the following recurrence relation:

$$T(n) = \begin{cases} 4T(n/2) + 1 & , n > 1 \\ 1 & , n = 1 \end{cases}$$

**Q9)** Use the relevant Master's Theorem to deduce the time complexity of the following recurrence relation:

$$T(n) = \begin{cases} 2T(n/2) + n^2 & , n > 1 \\ 1 & , n = 1 \end{cases}$$