1 First Task

1.1 First Subtask: Recursion Relation

We need to find the relation between the number of upward and downward equilateral triangles as the Dryads replicate at each step. So the recursion relations are:

$$U(n) = 3 * U(n-1) + D(n-1), n \geq 1$$
$$D(n) = U(n-1) + 3 * D(n-1), n \geq 1$$
$$where, U(0) = 1, D(0) = 0$$

1.2 Second Subtask: Recursive Method Code

Code is attached.

1.3 Third Subtask: Iterative Method Code

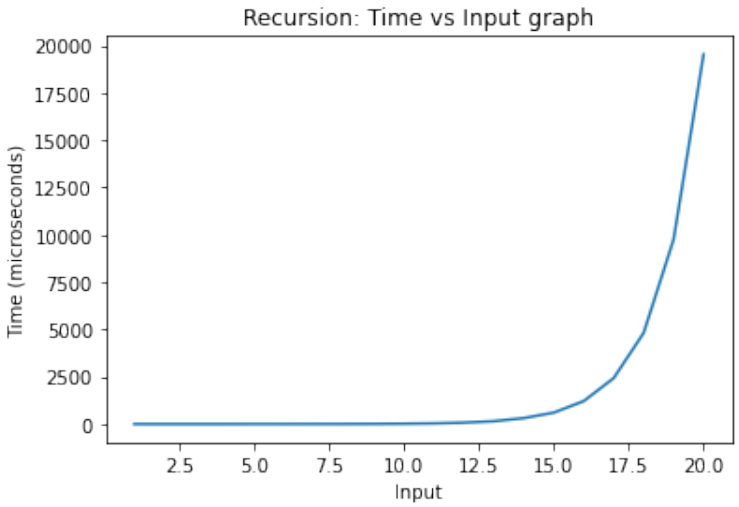
Code is attached.

1.4 Fourth Subtask: Matrix Exponentiation Code

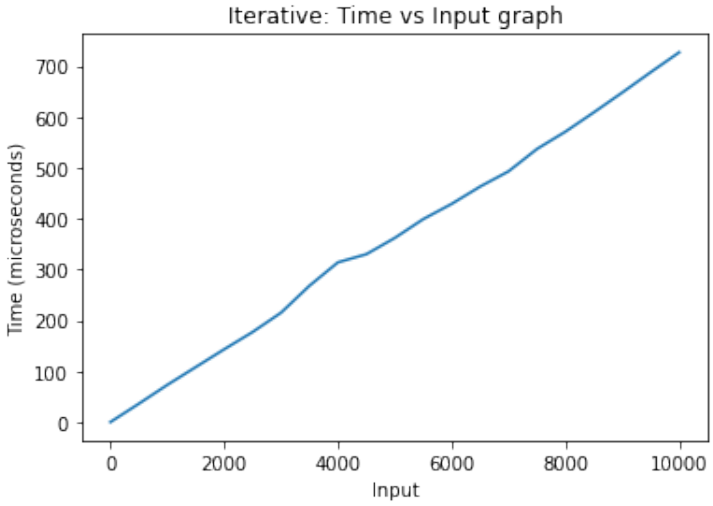
Code is attached.

1.5 Fifth Subtask: Input vs Time Graphs

1.5.1 Recursive Method



1.5.2 Iterative Method



1.5.3 Matrix Exponentiation Method