Homework 1

Theorem 3: If T(n) is a polynomial of degree x, then T(n)=O(nx).

Proof by induction:

Base case: n=1

T(1) of degree x is equal to 1x which is 1. O(1x) is also equal to 1. So base case holds for T(n)=O(nx).

Hypothesis: Assume that n=k such that T(k)=O(kx) for k 1.

Inductive step: Show that n=k+1 such that T(k+1)=O((k+1)x) is also true for k ≥ 1.

T(k+1) = O((k+1)x)

By definition of polynomial, we can say that T(k+1) = (k+1)x

O((k+1)x) by definition is the same as O(k+1) = (k+1)x

This shows that they move at the same speed and time complexity by the Induction Hypothesis

By Induction, we have shown that T(n)=O(nx)