Design and Analysis of Algorithm

Assignment no 1

**Question no 1:**

Determine the Big O notation for the following function: f(n) = 3n^2 + 5n + 9

**Question no 2:**

Show 2n^2 + n + 1 is Ω(n2).

**Question no 3:**

a) Explain how asymptotic notations follow the transitive property.

b) Provide an example to demonstrate how if f(n) is O(g(n)) and g(n) is O(h(n)), then f(n) is also O(h(n)).

**Question no 4:**

a) Given two functions f(n) = 2n^2 and g(n) = n^3, prove whether f(n) = Ω(g(n)) is true or false. b) n/100 = Ω(n) True or False.

**Question no 5:**

**for (int i = 1; i <= n; i++) { for**

**(int j = 1; j <= i \* i; j++) { for**

**(int k = j; k <= j + j; k++) {**

**// Some constant-time operation here**

**}**

**}**

**}**

a) Express the time complexity using Big O notation.

b) Simplify the time complexity expression.

**Question no 6:**

**for (int x = 1; x <= n; x++) {**

**for (int y = 1; y <= n; y++) {**

**for (int z = 1; z <= n ; z++) {**

**print (x & y & z);**

**}**

a) Express the time complexity of above provided code snippet.

**Question no 7:**

**public static int method(int[] arr) {**

**int n = arr.length; int result = 0;**

**for (int i = 1; i < n; i \*= 2) {**

**result += arr[i];**

**}**

**return result;**

**}**

a) Express the time complexity of above provided code snippet (step by step justifications)