Question 1.

Algorithm Algorithm_one()

Output: the max difference between two integers

Ints ← new Array[1000]	2
n ← ints.length	2
count ← 0	1
for i←0 to n do	n + 2
Ints[i]← Math.Random	2(n + 1)
if ints[i]%2=0 **then**	**2(n + 1)**
increment count	**2(n + 1)**
evenNymbers ← new int[count]	2
j ← 0	1
for i ← 0 to n do	**n + 1**
if ints[i] %2 = 0 then	**2(n + 1)**
evenNumbers[j] ← ints[i]	**2(n + 1)**
increment j	**2(n + 1)**
max← 0	1
n← evenNumbers.length	2
for i ← 0 to n do	n +2
for j←0 to n do	$n^2 + 2$
k←eventNumber[i] - eventNumber[j]	$(n^2 +2)*4$
if k>max	$(n^2 + 2)*4$
max←k	$(n^2 + 2)*4$
return k	1
	_____
	$13n^2 + 15n + 55 \rightarrow$ **$O(n^2)$**

Algorithm Algorithm_Two ()

Output: the max difference between two integers

We have a helper static method RandomNumber to generate a Random Number and return an Array with the Randomly generated numbers.

Ints ← new Array[1000]	2
ints← RandomNumber	n
n← ints.length	2
max← 0;	1
for i←0 to n-1 do	n + 1
if ints[i]%2=0 **then**	**2(n)**
for j← i to n-1 do	**2(n^2)**
if ints[j]%2=0 **then**	**2(n^2 -1)**
k i← ints[i] – ints[j]	**2(n^2 -1)**
if max<k **then**	**2(n^2 -1)**
max← k	**2(n^2 -1)**
Return max	1
	_____
	$10n^2 + 4n – 1$ ---- **$O(n^2)$**

Algorithm Algorithm_Three ()

Output: the max difference between two integers

We have a helper static method RandomNumber to generate a Random Number and return an Array with the Randomly generated numbers. And assuming the min a number can be is -1000 and max a number can be is 1000.

ints ← new Array[1000]	2
ints← RandomNumber	n
n← ints.length	2
max← -1000	1
min←1000	1
for i←0 to n-1 do	n + 2
if ints[i] %2=0 **then**	**2n**
if max < ints[i] **then**	**2n**
max ← ints[i]	2n
if min > ints[i] **then**	**2n**
min← ints[i]	2n
Return max-min	1
	_____
	12n + 9 → **O(n)**

Question 2.

10,1	Θ(1)
$\log n$	Θ$\log n$
$(\log n)^2$	Θ$(\log n)^2$
ln	Θ(ln)
$n^{1/k}$ k>3	Θ($n^{1/3}$) k>3
$n^{1/3}$	Θ$n^{1/3}$
$n^{1/2}$	Θ$n^{1/2}$
$n^{1/3}\log n$	Θ$n^{1/3}\log n$
$n^{1/2}\log n$	Θ$n^{1/2}\log n$
$n\log n$	Θ $n\log n$
$\log n^n$	Θ$\log n^n$
n^2	Θn^2
n^3	Θn^3
n^k k>3	Θn^k k>3
2^n	Θ2^n
3^n	Θ3^n
n!	Θn!
n^n	Θn^n