



## BM 210 Algoritma Analizi (Analysis of Algorithms)

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## Konular

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### Comparison

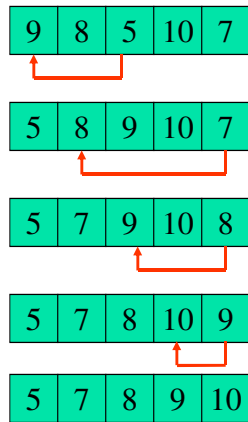
- Selection Sort
- Insertion Sort
- Bubble Sort
- Shell Sort
- Merge Sort
- Quick Sort
- Heap Sort

### No comparison

- Count Sort
- Radix Sort
- Bucket Sort

# Selection Sort

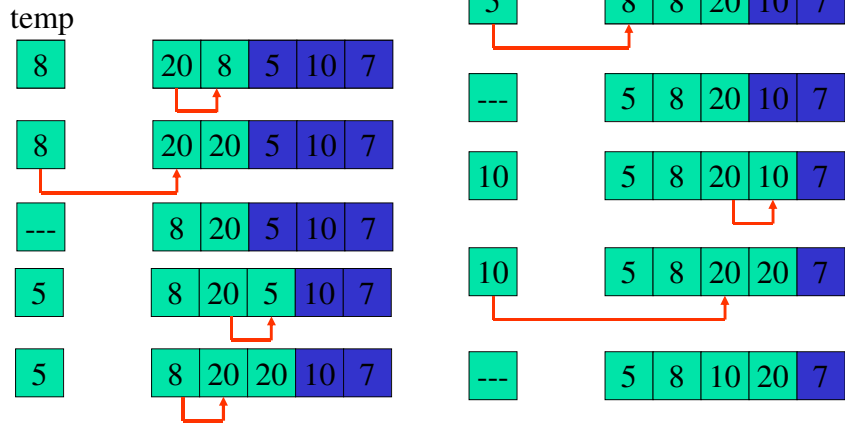
■  $O(n^2)$



(A) S O R T I N G E X A M P L E  
 A S O R T I N G E X (A) M P L E  
 A A O R T I N G (E) X S M P L E  
 A A E R T I N G O X S M P L (E)  
 A A E E T I N (G) O X S M P L R  
 A A E E G (I) N T O X S M P L R  
 A A E E G I N T O X S M P (L) R  
 A A E E G I L T O X S (M) P N R  
 A A E E G I L M O X S T P (N) R  
 A A E E G I L M N X S T P (O) R  
 A A E E G I L M N O S T (P) X R  
 A A E E G I L M N O P T S X (R)  
 A A E E G I L M N O P R (S) X T  
 A A E E G I L M N O P R S X (T)  
 A A E E G I L M N O P R S T X  
 A A E E G I L M N O P R S T X

# Insertion Sort

■  $O(n^2)$



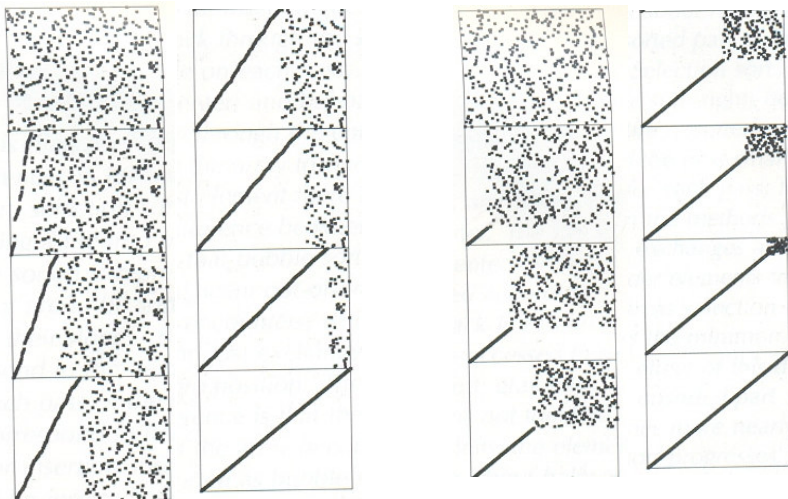


## Insertion Sort

A S O R T I N G E X A M P L E  
A (S) O R T I N G E X A M P L E  
A (O) S R T I N G E X A M P L E  
A O (R) S T I N G E X A M P L E  
A O R S (T) I N G E X A M P L E  
A (I) O R S T N G E X A M P L E  
A I (N) O R S T G E X A M P L E  
A (G) I N O R S T E X A M P L E  
A (E) G I N O R S T X A M P L E  
A E G I N O R S T (X) A M P L E  
A (A) E G I N O R S T X M P L E  
A A E G I (M) N O R S T X P L E  
A A E G I M N O (P) R S T X L E  
A A E G I (L) M N O P R S T X  
A A (E) E G I L M N O P R S T X  
A A E E G I L M N O P R S T X



## Dinamik Karakteristikler



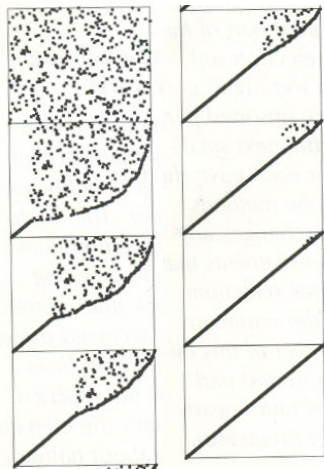
Insertion Sort

Selection Sort





## Dinamik Karakteristik



Standart Bubble Sort



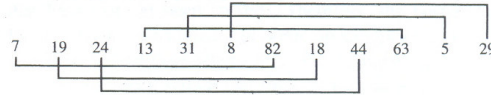
Shaker Bubble Sort



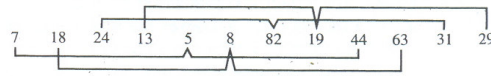
## Shell Sort

■  $O(n^2)$

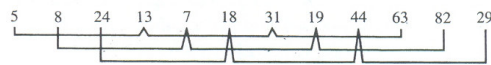
$h_5 = 6$



$h_4 = 4$



$h_3 = 3$



$h_2 = 2$



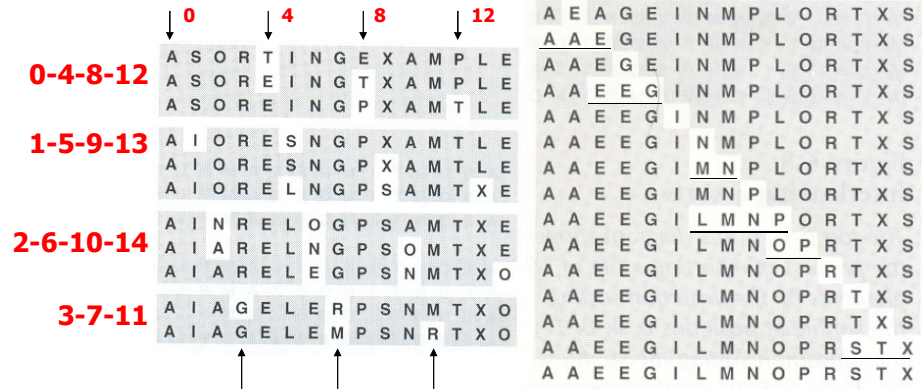
$h_1 = 1$



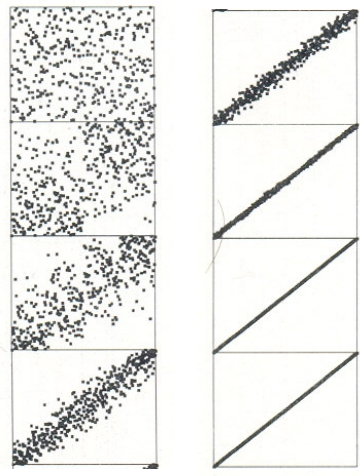
# Shell Sort

■  $O(n^2)$

Hepsi birer birer alınır



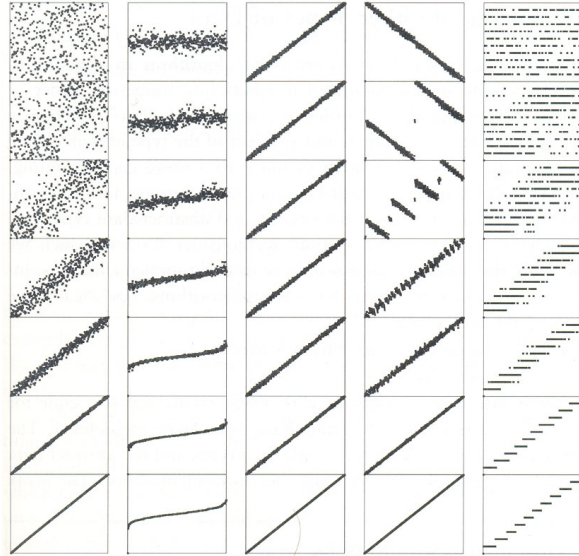
# Shell Sort Dinamik Karakteristik





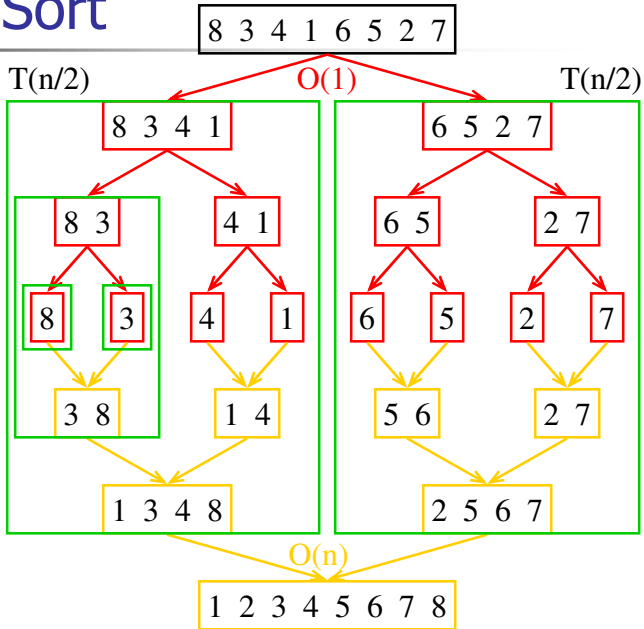
## Shell Sort Dinamik Karakteristik

Random  
Gaussian  
Yaklaşık Sıralı  
Ters Sıralı  
10 farklı seviyeli



## Merge Sort

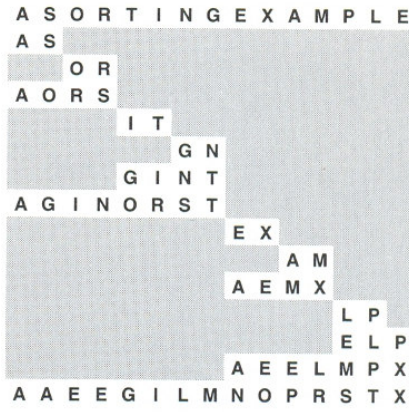
■  $O(n \lg n)$



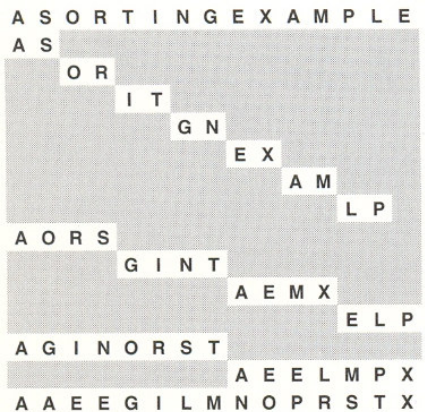




# Merge Sort



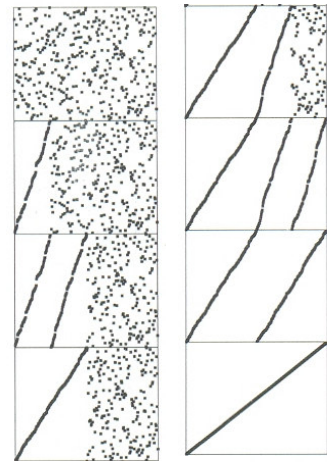
**Top-down**



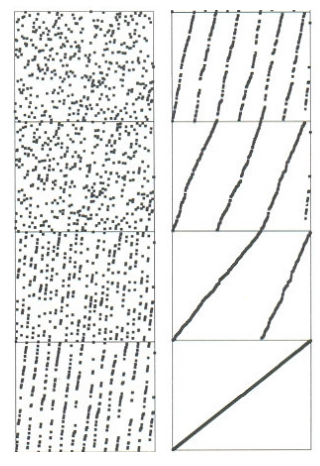
**Bottom-up**



# Merge Sort



**Top-down**



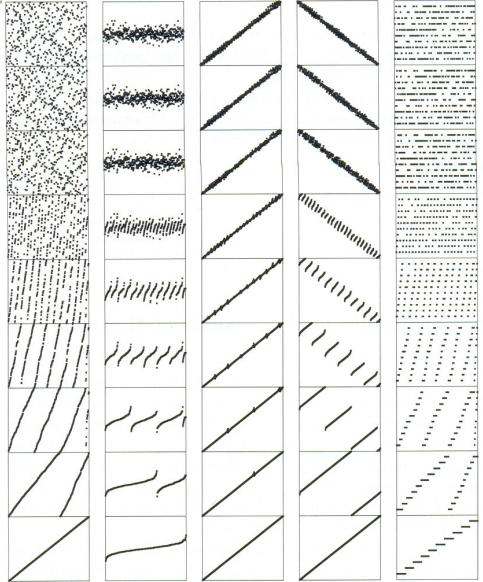
**Bottom-up**





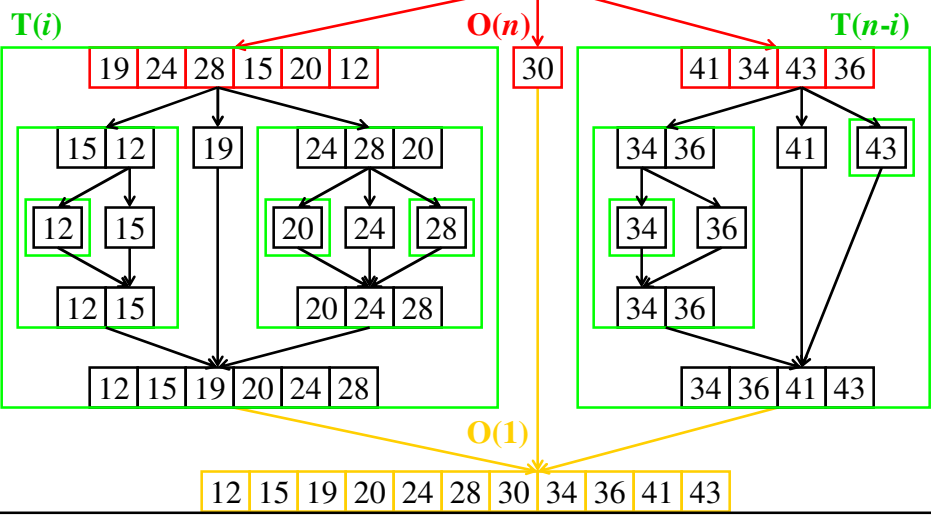
# Merge Sort (Bottom-Up)

Random  
Gaussian  
Yaklaşık Sıralı  
Ters Sıralı  
10 farklı seviyeli



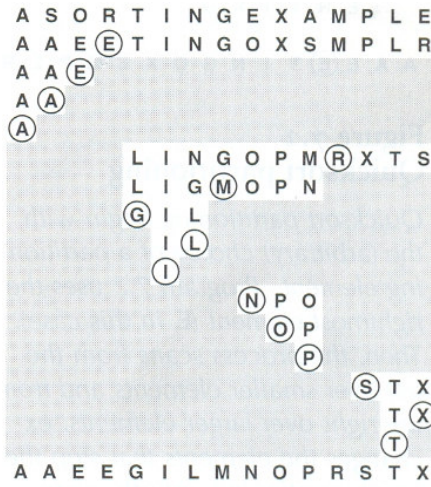
# Quick Sort (nlgn)

30 19 24 28 41 34 15 43 20 12 36

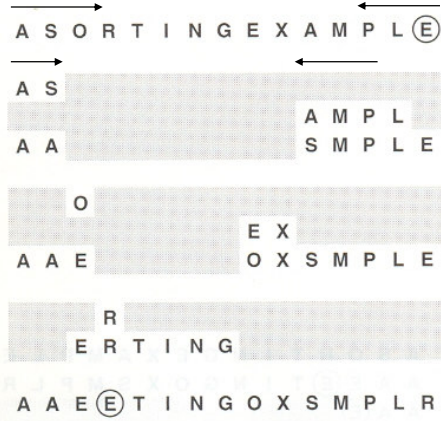




# Quick Sort



**Örnek Sıralama**

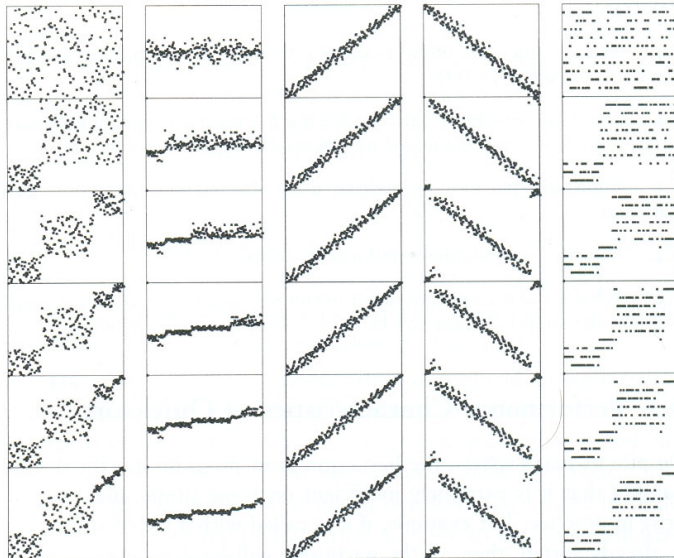


**Partition**



# Quick Sort

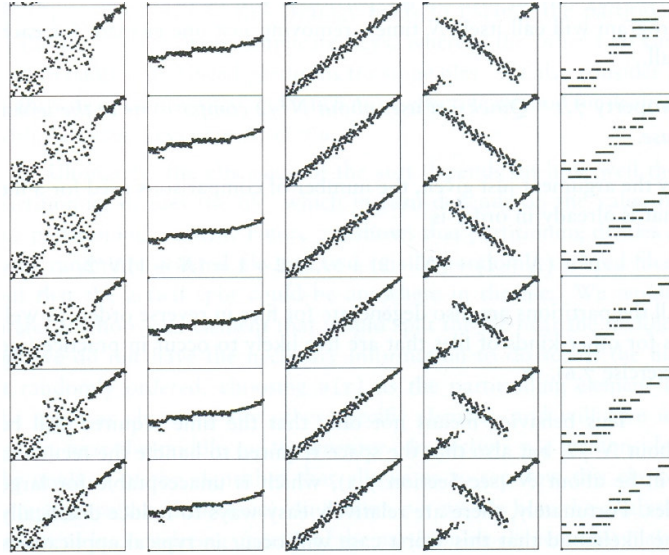
**Random**  
**Gaussian**  
**Yaklaşık Sıralı**  
**Ters Sıralı**  
**10 farklı seviyeli**





# Quick Sort

**Random**  
**Gaussian**  
**Yaklaşık Sıralı**  
**Ters Sıralı**  
**10 farklı seviyeli**



# Heap Sort

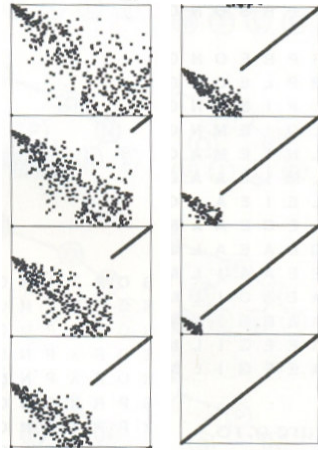
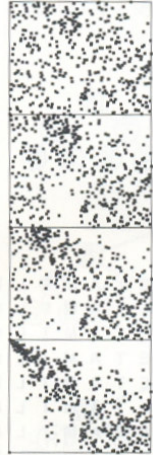
A	S	O	R	T	I	N	G	E	X	A	M	P	L	E	T	S	P	R	E	O	N	G	E	A	A	M	I	L	X
A	S	O	R	T	I	N	G	E	X	A	M	P	L	E	S	R	P	L	E	O	N	G	E	A	A	M	I	T	X
A	S	O	R	T	P	N	G	E	X	A	M	I	L	E	R	L	P	I	E	O	N	G	E	A	A	M	S	T	X
A	S	O	R	X	P	N	G	E	T	A	M	I	L	E	P	L	O	I	E	M	N	G	E	A	A	R	S	T	X
A	S	O	R	X	P	N	G	E	T	A	M	I	L	E	O	L	N	I	E	M	A	G	E	A	P	R	S	T	X
A	S	P	R	X	O	N	G	E	T	A	M	I	L	E	N	L	M	I	E	A	A	G	E	O	P	R	S	T	X
A	X	P	R	T	O	N	G	E	S	A	M	I	L	E	M	L	E	I	E	A	A	G	N	O	P	R	S	T	X
X	T	P	R	S	O	N	G	E	A	A	M	I	L	E	L	I	E	G	E	A	A	M	N	O	P	R	S	T	X

**Construction (Build-Heap)**

I	G	E	A	E	A	L	M	N	O	P	R	S	T	X
G	E	E	A	A	I	L	M	N	O	P	R	S	T	X
E	A	E	A	G	I	L	M	N	O	P	R	S	T	X
E	A	A	E	G	I	L	M	N	O	P	R	S	T	X
A	A	E	E	G	I	L	M	N	O	P	R	S	T	X
A	A	E	E	G	I	L	M	N	O	P	R	S	T	X



# Heap Sort

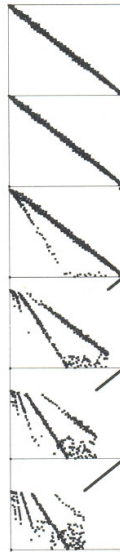
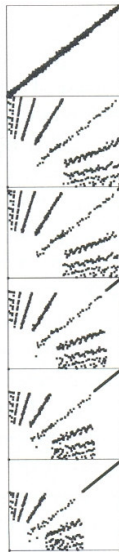
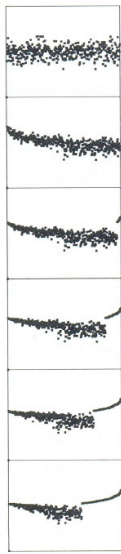
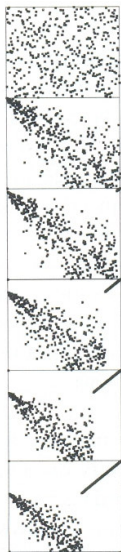


**Construction (Build-Heap)**



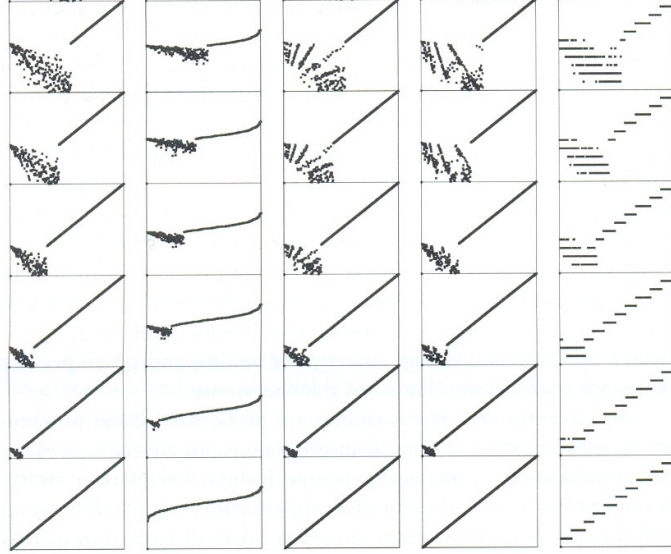
# Heap Sort

**Random**  
**Gaussian**  
**Yaklaşık Sıralı**  
**Ters Sıralı**  
**10 farklı seviyeli**



## Heap Sort

Random  
Gaussian  
Yaklaşık Sıralı  
Ters Sıralı  
10 farklı seviyeli



## Haftalık Ödev

- Selection sort, Insertion sort, Bubble sort, Shell sort, Merge sort, Quick sort, ve Heap sort algoritmalarının performanslarını random, gaussian, yaklaşık sıralı, ters sıralı ve 10 farklı seviyeli olarak alınan ve adedi dışarıdan girilen değerler için karşılaştıran bir program yazınız. Programda seçilen algoritmanın çalışması ve dizilerdeki değişimler grafik olarak gösterilecektir. Program C# ile yazılacak ve görsel arabirime sahip olacaktır.

**Not:** Ödev programın çıktısıyla birlikte diskete kaydedilerek teslim edilecektir. Ödevler en geç 12 Nisan 2005 tarihine kadar verilecektir.