import java.util.Random;

public class search {

public static void main(String[] args) {

int [] A= new int[50000000];

int n=A.length;

Random rand=new Random();

for(int i=0;i<n;i++){

A[i]=i;

}//for()

for(int i=0;i<n;i++){

int j=rand.nextInt(n-i)+i;

int swap = A[i];

A[i]=A[j];

A[j]=swap;

}//shuffle

int x=42;

int b=A[0];

int w=-10;

int a=rand.nextInt(100000000);

long start =System.nanoTime();

linearSearch(A,n,x);

double duration = (System.nanoTime()-start)/1000000.0;

System.out.println("Searching array of size: "+n+"\nAlgorithm: linearSearch\nLooking for element:"+b+"\nResult: "+linearSearch(A,n,b)+"\nTime: "+duration);

System.out.println("Searching array of size: "+n+"\nAlgorithm: betterSearch\nLooking for element:"+x+"\nResult: "+betterSearch(A,n,x));

System.out.println("Searching array of size: "+n+"\nAlgorithm: sentinelLinearSearch\nLooking for element:"+x+"\nResult: "+sentinelLinearSearch(A,n,x));

System.out.println("Searching array of size: "+n+"\nAlgorithm: recursiveLinearSearch\nLooking for element:"+x+"\nResult: "+recursiveLinearSearch(A,n,0,x));

}//main()

public static int linearSearch(int[] data,int n, int x) {

int result=-1;

for(int i=0;i<n;i++){

if(data[i]==x){

result=i;

}//if()

}//for()

return result;

}//linearSearch()

public static int betterSearch(int[] data,int n, int x) {

for(int i=0;i<n;i++){

if(data[i]==x){

return i;

}//if()

}//for()

return -1;

}//betterSearch()

public static int sentinelLinearSearch(int[] data,int n, int x) {

int Last=data[n-1];

data[n-1]=x;

int i=0;

while(data[i]!=x){

i++;

}//while

data[n-1]=Last;

if(i<n-1||data[n-1]==x)

return i;

else

return -1;

}//sentinelLinearSearch()

public static int recursiveLinearSearch(int[] data,int n, int i,int x) {

if(i>=n)

return -1;

else if (data[i]==x)

return i;

else

return recursiveLinearSearch(data,n, i+1,x);

}//recursiveLinearSearch()

}