Solution to Practice Problems: Methods

1. Tracing Programs

For each program below, show what is displayed on the screen when the code executes.

```
import java.util.Arrays;
public class HelloWorld
{
  public static void main(String [] args)
  {
    int [] arr = {3, 5, 7};
    String arrStr = Arrays.toString(arr);
    System.out.println(arrStr);

    int max = Math.max(1, -5);
    System.out.println(max);

    String s = HelloWorld.getHello();
    System.out.println(s);
  }

  public static String getHello() {
    return "Hello, world!";
  }
}
```

screen

[3,5,7]
1
Hello, world!
Hello, world!

```
public class NestedCalls
{
  public static boolean mystery1(int a)
  {
    if(a > 0 && mystery2(-a)) {
      return true;
    }
    return false;
  }

  public static boolean mystery2(int b)
  {
    if(b + 2 > 0) {
      return false;
    }
    return true;
  }

  public static void main(String [] args)
  {
    System.out.println("main");
    int x = 3;
    if(mystery1(x)) {
      System.out.println("mystery1 returns true");
    }
    System.out.prinltn("mystery2 = " + mystery2(x));
  }
}
```

screen

main
mystery1 returns true
mystery2 = false

```
public class NamingAndScope
{
  public static void main(String [] args)
  {
    int x = 3;
    x = x();
    System.out.println(x);
    x = x(x+1);
    System.out.println(x);
    for(int i=0; i<2; i++) {
      x = x(x+3);
      System.out.println(x);
    }
  }

  public static int x()
  {
    int x = 5;
    return x + 7;
  }

  public static int x(int x)
  {
    return x + 1;
  }
}
```

screen

12
14
18
22

```
public class WhatsPrinted01 {
public static void func(int A[]) {
for (int i=1; i<A.length; i++)
A[i]+=A[i-1];
}

public static void main(String args[]) {
int A[] = {10,20,30};
func(A);
System.out.println(A[2]);
}
}
```

A will be passed to func. After change of A[1] to 30, A[2] = 60, then such a change will be brought back to the caller main.

screen

60

```
public class WhatsPrinted02 {
public static int func(int A[], int B[]) {
 A = B;
 return A[1];
}

public static void main(String args[]) {
 int A[] = {10,20,30};
 int B[] = {40,50,60};

 int x = func(A, B);
 System.out.println(x + " " + A[1]);
 }
}
```

Global A and B will be passed to local A, B in func. Then, local A is assigned to local B and return B[1]=50. However, global A is not changed!

screen

50 20

2. Develop method

a. Write a method that takes an integer X as an argument, and returns true if X is even, and false if X is odd.

```
public static boolean isEven(int X)
{
  if(X % 2 == 0) {
    return true;
  }
  else {
    return false;
  }
}
```

b. Write a method that takes an integer N as an argument, and displays a square of NxN stars.

```
public static void displaySquare(int N)
{
  for(int i=0; i<N; i++) {
    for(int j=0; j<N; j++) {
      System.out.print("*");
    }
    System.out.println();
  }
}
```

c. Write a method that takes an integer N as an argument, and returns true if N is prime, and false otherwise.

```
public static boolean isPrime(int N)
{
  for(int factor = 2; factor<N; factor++)
  {
    if(N % factor == 0) {
      return false;
    }
  }
  return true;
}
```

d. Write a method that takes an array of chars A, an integer j, and an integer k as arguments. The method should return a String consisting of the characters in A between positions j and k.

```
public static String subCharArray(char [] A, int j, int k)
{
  String ret = "";
  for(int i=j; i<k; i++)
  {
    ret = ret + A[i];
  }
  return ret;
}
```