

1. What are two features that must be found in every recursive method?

1. base case
2. call to self

→ 2. Write a recursive method **evenFactorial** which returns the even factorial of a number (that is, the product of all positive integers less than or equal to n). The factorial of 0 is 1.

```
public static int evenFactorial(int n)
{
    if (n == 0) return 1;
    if (n % 2 == 0)
        return n * evenFactorial(n-1);
    else
        return evenFactorial(n-1);
}
```

3. Write a recursive method **spaceIt** to print the digits of an integer on a single line with 2 spaces between each digit. So spaceIt(123) prints "1 2 3".

```
public static void spaceIt(int m)
{
    if (m > 9)
        spaceIt(m/10);
    System.out.print(m%10 + " ");
}
```

4. Given the following array how many times would a recursive binary search method be called when searching for the value 21?

```
int[] array = {3, 6, 8, 11, 14, 16, 21, 22};
```

Handwritten annotations: indices 0-7 above the array. Arrows point from index 0 to 1 (1), index 1 to 3 (1), index 3 to 5 (1), and index 5 to 6 (3). The number 3 is circled.

5. Given the following array how many times would a recursive binary search method be called when searching for the value 6?

```
int[] array = {0, 1, 2, 3, 4, 5, 7, 8, 9, 9};
```

Handwritten annotations: indices 0-9 above the array. Arrows point from index 0 to 1 (1), index 1 to 4 (4), index 4 to 5 (1), index 5 to 6 (1), and index 6 to 7 (2). The number 4 is circled.

6. What is returned by the call mystery(4)?

```
public static int mystery(int a)
{
    if(a>11)
        return 5;
    return a + mystery(a+3);
}
```

Handwritten calculation: $4 + 7 + 10 + 5 = 26$. The result 26 is circled.

7. What is returned by the call mystery(6)?

```
public static int mystery(int a)
{
    if(a==3)
        return 1;
    return a * mystery(a-1);
}
```

Handwritten calculation: $6 \cdot 5 \cdot 4 \cdot 1 = 120$. The result 120 is circled.

8. What is printed by the call mystery(4)?

```
public static void mystery(int a)
{
    System.out.print(a);
    if(a<7)
        mystery(a+2);
}
```

Handwritten output: 4 6 8 (boxed)

9. What is returned by the call mystery(4)?

```
public static void mystery(int a)
{
    if(a<7)
        mystery(a+2);
    System.out.print(a);
}
```

Handwritten output: 8 6 4 (boxed)