Week 7 CS 302

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This Week

Lab: Static Methods

P2: Milestone 1, Partners due Thursday

P1 Feedback
- regrade requests

Exam 1 results
- review, discuss
Lecture

More methods
- multiple files

Constants
static memory area

Debugging

exam review
What is print out?

```java
static void one() {
    System.out.print( "one ");
}
static void two(int num) {
    System.out.print("two ");
    one();
    System.out.print("two ");
}
public static void main( String []args) {
    two( 3);
    System.out.print("main ");
}
```
What do a and b have in common?

public static void main(String []args) {
    mA();
    mB();
}

static void mA() {
    int a = 10;
}

static void mB() {
    int b;
    System.out.println( b);
}

may be the exact same memory location
looking at b will reveal a (unintentionally)
nothing
Error
Constants
static Memory area
What is the value of num?

class Stuff {
    final static int MAX_VALUE = 10; //allowed
    static int num = 6;  //NOT allowed in P2
    static void change( int n) {
        num = n + 1;
    }
    public static void main( String [] args) {
        int num = MAX_VALUE;
        change( num);
        System.out.println("num:" + num);
        System.out.println("Stuff.num:" + Stuff.num);
    }
}
What are values of x and y?

static int x;
static int y = 2;
static int methodA( int y) {
    x = y + 1;
    return x + y;
}
public static void main(String[] args) {
    int x = 5;
    y = methodA( x);
    System.out.println("x="+x+ " y="+y);
}
Instance methods
What is the answer?

String s1 = "An important programming tool.";
String s2 = s1.substring( 9, 10);
String s4 = new String( "?");
if ( s1.contains( "gram")) {
    s4 = s1.substring( 2, 4).trim();
}
char c3 = s1.charAt( s1.indexOf('g') -3);
String answer = (s2 + c3 + s4).toUpperCase();
String str = "Falling Off a Cliff " + "by Eileen Dover";
    System.out.println( str.substring(3,6));

String str2 = "The Future of Robotics " + " by Cy Borg and Anne Droid";
    System.out.println( str2.substring( str2.indexOf('e') + 1, str2.indexOf('o')).trim());

Strings courtesy of Boy Scouts
What kind of methods?

Math.max( 10, 20);

Random randGen = new Random();
randGen.nextInt( 5);

class methods (static)
instance methods (non-static)

<table>
<thead>
<tr>
<th>Method</th>
<th>Type</th>
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<tbody>
<tr>
<td>max</td>
<td>class</td>
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<tr>
<td>nextInt</td>
<td>instance</td>
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Instance vs. Class (static) Methods

Class (static) Methods
- method definition has “static” modifier
- use name of class when calling
  ```java
  Math.max( 10, 20);
  ```

Instance (non-static) Methods
- method definition does Not have “static” modifier
- use instance of class when calling
  ```java
  Random randGen = new Random();
  randGen.nextInt( 5);
  ```
Where is memory allocated?

```java
public static void main(String[] args) {
    String name;
    dogname = new String("fido");
    name = new String("spot");
}
```
Debugging with Print statements

See what is going on.
Divide and conquer.
Recall Fibonacci Sequence

1 1 2 3 5 8 13 21 ...

Each is the sum of the previous 2.

https://en.wikipedia.org/wiki/Fibonacci_number
Iterative solution

```java
public static void main(String[] args) {
    int n = 10;
    int[] fib = new int[n];
    fib[0] = 1;
    fib[1] = 1;
    for (int i = 2; i < n; i++) {
        fib[i] = fib[i-1] + fib[i-2];
    }
    System.out.println("fib "+n+"=" + fib[n-1]);
}
```
How many times is fib method called?

```java
static int fib(int num) {
    if (num <= 1) return 1;
    else return fib(num - 1) + fib(num - 2);
}
```

```java
public static void main(String[] args) {
    System.out.println("fibonacci 4: " + fib(4));
}
```

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<td>Error</td>
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