Computer Science 145

Exam 1—Spring 2012

Name: _____

Problem	Score	Possible
1		10
2		10
3		10
4		10
Total		40

This is a closed-book, no-calculator, no-electronic-devices, individual-effort exam. You may reference one page of handwritten notes. All answers should be clearly written. Questions that require code should be written using correct Java syntax. Please do all your work on these pages. Partial credit will be given if work is shown and is partially correct. You may write `SOP` to represent `System.out.println`.

Class	Method/Constructor	Description
`Scanner`	`Scanner(System.in)`	create `Scanner` for parsing `System.in`
	`Scanner(String text)`	create `Scanner` for parsing `text`
	`String next()`	get next delimited word
	`double nextDouble()`	get next delimited `double`
	`boolean nextBoolean()`	get next delimited `boolean`
	`int nextInt()`	get next delimited integer
`String`	`int length()`	get number of characters
	`char charAt(int i)`	get the character at index `i`
	`String toUpperCase()`	get a `String` like this one, but in all-caps
	`String substring(int l)`	get substring from index `l` to `String`'s end
	`String substring(int l, int r)`	get substring from index `l` to right before index `r`
`Math`	`int max(int a, int b)`	get the maximum of `a` and `b`.
	`double pow(double base, double exponent)`	raise `base` to the `exponent` power.
`Random`	`Random()`	create a random number generator.
	`nextInt(int i)`	get a random number between 0 and $i-1$, inclusive.
	`nextDouble()`	get a random number between 0.0 and 1.0.

1. *De Claire*

   For the following problems, write variable declarations according to the specifications. Include assignments where requested. Make sure you use appropriate types and correct Java syntax.

   (a) Example: declare a variable `foo`. Give it the value `true`.

   ```
   boolean foo = true;
   ```

   (b) Declare a variable `nCents`, which will hold a whole number of cents. Do not assign it a value.

   (c) Declare a variable `url`, which will hold a web address. Give it the initial value "`http://www.uwec.edu`".

   (d) Declare a variable `minimumWage`. Give it the initial value 5.75.

   (e) Declare a `Scanner` variable named `parser`. Do not assign it a value.

   (f) Assume you have an `int` variable named `a`. Declare a variable named `isBig`. Assign it such that it's `true` if `a` is greater than 100 and `false` otherwise. Do not use an `if` statement.

   (g) Assume you have two `String`s `s1` and `s2`. Declare a variable `twolen` and assign it the length of the two `String`s combined.

2. *"EVALU" + 8*

Evaluate the following expressions, one subexpression at a time by (a) underlining the highest precedent operation, (b) writing the type of the operation below it, (c) rewriting the entire expression with the operation evaluated, and (d) repeating until only a literal value remains.

(a) Example:

```
8 + Math.max(2, 1)
          int
8 + 2
 int
10
```

(b) `1 + Math.pow(2.0, 3)`

(c) `7 >= 14 / 2`

(d) `"$" + 3 * 0.5`

(e) `15 % 12 + " PM"`

(f) `(3.5 + 1) * 2 - 1`

3. *Calculating*

   You:

   - are plotting a large-scale water balloon fight,
   - have 10 roughly-spherical balloons of various radii,
   - would like to determine the volume of water needed to fill them to capacity,
   - and know that the volume of a sphere is $\frac{4}{3}\pi \cdot radius^3$.

   Write a complete class `BalloonCalc` with a `main` method that prompts the user to enter a radius, gets the radius from `System.in`, and prints out the volume of balloon with the given radius to `System.out`. The process is repeated 10 times by means of a loop, and after the last balloon, the total volume needed is also printed. Following is an example abridged interaction:

```
Radius? 2
33.510
Radius? 3
113.10
...
Total: 1356.68
```

4. *Subfootines*

(a) Write a method `entag` that takes two `String` parameters: one for a tag and one for text to enclose in the tag. Return a new `String` of the form `"<TAG>text</TAG>"`. The parameter tag may not be capitalized; make sure the returned `String` has the tag capitalized. For example, `entag("body", "foo")` → `"<BODY>foo</BODY>"`.

(b) Write a method `getRandomSequence` that takes in a single `int` parameter named `n`. It returns a `String` of `n` random ints between 0 and 10, separated by spaces. For example, `getRandomSequence(3)` → `"3 10 7"`. Use `Random` to get random numbers.