

CSSE 230 Day 4

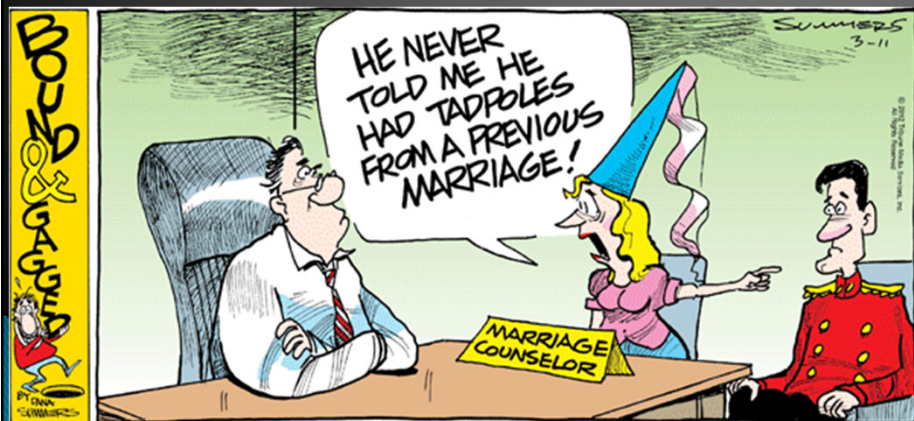
Diagnostic Quiz Review
Comparable, Comparator, and Function Objects

Check out from SVN: [DiagQuizReview](#)

Questions?

Written Assignment 2
Pascal

By tomorrow (8 AM):
Fill out
Hardy/Colorize
partner preference
survey on ANGEL



Finish up Function Object discussion from last time
Add an anonymous Comparator to main().

Diagnostic Quiz Review



Some questions that many students missed

Expression questions

- ▶ Give a **very simple** Java expression that is equivalent to:

!(x && !x)

BTW: Never write something like
`if (a.isVisible() == true)`

- ▶ What are the values of each of the following expressions, if `x==5` and `y ==7` ?

x + ' ' + y

x + " " + y

x + y + " "

Simple big-Oh questions

- ▶ What is the worst-case Big-Oh running time of an unsuccessful sequential search of an unordered array that contains N elements?
- ▶ What is the worst-case Big-Oh running time of an unsuccessful binary search of an array that contains N
- ▶ What is the Big-Oh running time of merge sort of an array that contains N elements?

Q1-3

Method Selection Overloading vs. Overriding

- ▶ In Eclipse, open:
 - examples. StaticParamsDemo**
- ▶ From the **DiagQuizReview** project
- ▶ This is based on Figure 4.45, page 166 of Weiss.
- ▶ Section 4.9 begins:
 - "A common myth is that all methods and all parameters are bound at runtime. This is not true."
 - Methods that are static, final, or private.

Note that all of the code from the Weiss book is available online. You can run it, modify it, and experiment

Q4

Aliasing

- ▶ How many objects are created in this code?

```
MyNumber a = new MyNumber();  
a.setNum(5);  
MyNumber b = new MyNumber();  
b.setNum(6);  
MyNumber c = a;  
System.out.println(c);
```

- ▶ What is "aliasing"?

Q5

Default Constructors

- ▶ What does Java do if no constructor is declared for a class?
 - How can we instantiate the class?
 - What values do the fields get?

```

class Janbalaya {
    int beans;
    double rice;
    Insect crayfish;

    public String toString() {
        return beans + " " + rice + " " + crayfish;
    }
}

```

Parameter Passing

- ▶ this code is available In Eclipse, open **examples. WhatIsX**

```

public static void main(String[] args) {
    int x = 0;
    f(x);
    System.out.println(x);
}

private static void f(int x) {
    /*
     * TODO: Without adding printing, can you change the body of
     * this method to get this program to print:
     * 3?
     * 3.5?
     * Anything else?
     */
}

```

Q6-7

More Big-Oh Practice

```
for (int i = 0; i < n; i++)
  for (int j = 0; j < i; j++)
    sum++;
```

34% of students answered $N \log N$.
Where could the log come from?

```
for (int i = 0; i < n; i++)
  for (int j = 0; j < n * n; j++)
    for (int k = 0; k < j; k++)
      sum++;
```

```
for (int i = 1; i < n; i = i * 2)
  sum++;
```

One more distinction

- ▶ **throw** versus **throws**
 - Part of exception handling
 - Signal an error with: **throw new ExceptionType()**
 - Abdicate responsibility with:


```
void myMethod() throws ExceptionType {
    ...
}
```

Interlude

- ▶ Computer Science is no more about computers than astronomy is about telescopes.

Donald Knuth

Interlude

- ▶ Computer Science is no more about computers than astronomy is about telescopes.

Donald Knuth

Finite State Machines

» Also known as
Deterministic Finite Automata

A Finite State Machine (FSM)

Q8-9

- ▶ A finite set of **states**,
 - One is the **start state**
 - Some are **final**, a.k.a **accepting**, states
- ▶ A finite **alphabet** (input symbols)
- ▶ A **transition function**
- ▶ How it works:
 - Begin in start state
 - Read an input symbol
 - Go to the next state according to transition function
 - More input?
 - Yes, then repeat
 - No, then if in accept state, return true, else return false.

Q10

Example

- ▶ Draw a FSM to determine whether a lowercase sequence of characters contains each of the 5 regular vowels once in order
 - Example: **facetious**
- ▶ In some version of FSMs, each transition generates output.

Another FSM Example



Draw state diagrams for these FSMs

- ▶ Indicate the Start State and final (accepting) states
- ▶ FSM1:
 - Input alphabet {0, 1}
 - Accepts (ends in an accepting state) all input strings that do NOT contain **010** as a substring
- ▶ FSM2: (only if you get the first one done quickly)
 - Input alphabet {0, 1}
 - Accepts (ends in an accepting state) all input strings that are binary representations of numbers that are divisible by 3

Hints: Use 4 states, a start state plus 1 state each for $x\%3==0$, $x\%3==1$, and $x\%3==2$.

What does the arrival of a 0 do to the current value? (doubles it) What about a 1?

x	binary	x	binary
0	0	7	111
1	1	8	1000
2	10	9	1001
3	11	10	1010
4	100	11	1011
5	101	12	1100
6	110	13	1101

Colorize, Coming Soon

- ▶ A pair programming assignment.
- ▶ Due (along with Hardy, Part 2) on Monday of week 4.

Colorize program assignment

- ▶ Input: legal Java source code
- ▶ Output: colorized HTML
 - Keywords in blue, strings in red, comments in green, everything else in black
 - Layout just like original Java input file

```
// Opening comment. Note that a "string" is ignored here.
class /* Bad name */ Stupid {
    int x;
    String t = "A string with a /* in it";
    String p = "A string with a \" in it";
    boolean b = t.compareTo(p) < 0;

    public static void main(String [] args) {
        System.out.println(" " + t + " " + p);
        System.out.println("Can you think of other interesting cases that your ");
    }
    /* Notice that comments /* do not "nest" in Java // */
}
```

We can use an FSM for this!

Q10-11

Tomorrow

- ▶ Maximum Contiguous Subsequence Sum problem from Weiss Chapter 5.

Work Time

» Pascal Christmas Tree

WA2