Homework 2 due 10 pm tomorrow, February 5th
Homework 3 assigned by Monday, February 8th, possibly sooner

Program 1 due 10 pm Sunday, February 14th, TIME IS RUNNING OUT!

Assignment questions? Post on Piazza or consult with a TA during scheduled hours.

Use the 367 Forms to report any exam conflicts or McBurney exam accommodations.

Email your instructor by tomorrow, Friday, 2/5, if you participate in religious observances that might interfere with course requirements. Include your name, UW ID#, date and explanation.

Last Time
Handin using the 367 Forms
Exceptions Review
• throwing
• handling
• execution
• practice with exception handling

Today
Exceptions Review (from last lecture)
• throws and checked vs. unchecked
• defining
Java Primitives vs. References Review
Chains of Linked Nodes
• ListNode class
• practice with chains of nodes

Next Time
Read: continue Linked Lists
Chains of Linked Nodes
• more practice with chains of nodes
Java Visibility Modifiers
LinkedList Class
Primitive vs. Reference Types: Assignment

Primitives

```java
assume code is in main()
int x, y, z;
x = 11;
y = x;
z = x;
z = 33;
y = 22;
```

What does each variable contain after the code above executes?

A.) x has y has z has
B.) x has y has z has
C.) x has y has z has

References

```java
assume code is in main()
ArrayList<String> x, y, z;
x = new ArrayList<String>();
y = x;
z = x;
y = new ArrayList<String>();
z.add("Computer");
y.add("Science");
```

What does each ArrayList contain after the code above executes?

A.) x’s ArrayList has y’s ArrayList has z’s ArrayList has
B.) x’s ArrayList has y’s ArrayList has z’s ArrayList has
C.) x’s ArrayList has y’s ArrayList has z’s ArrayList has

What do x, y and z contain?

☆
Primitive vs. Reference Types: Parameter Passing

Primitives

Given:

```
void mod1(int x) {
    x = 42;
}
```

Execute code in `main()`:

```
int x = 11;
int[] y = {11, 22, 33};
mod1(x);
mod1(y[2]);
```

→ What does variable `x` and array `y` in `main` contain after the code above executes?

A.) `x` has 

B.) `x` has 

C.) `x` has 

→ What happens if we call `mod1(y)` in `main`?
Primitive vs. Reference Types: Parameter Passing

References

Given:

```java
void mod2(int[] x) {
    x[0] = 21;
}

void mod3(int[] x) {
    x = new int[x.length];
    x[0] = 42;
}
```

Execute code in `main()`:

```java
int   x = 11;
int[] y = {11, 22, 33};
mod2(y);
mod3(y);
```

→ What does variable `x` and array `y` in `main` contain after the code above executes?

A.) `x` has `y`'s array has
B.) `x` has `y`'s array has
C.) `x` has `y`'s array has

→ What happens if we call `mod2(x)` in `main`?
Programmer’s Memory Model for Java

Call Stack
contains

birth
deaTH

Heap
contains

birth
deaTH

Static Data
contains

birth
deaTH
New Data Structure - Chain of Linked Nodes

The Data Structure

Array vs. Chain of Nodes

Goal
Listnode Class

class Listnode<E> {

    private E data;
    private Listnode<E> next;

    public Listnode(E d) {
        this(d, null);
    }

    public Listnode(E d, Listnode<E> n) {
        data = d;
        next = n;
    }

    public E getData() { return data; }
    public Listnode<E> getNext() { return next; }

    public void setData(E d) { data = d; }
    public void setNext(Listnode<E> n) { next = n; }
}
Practice: Using Listnodes

→ **Draw a memory diagram** corresponding to the given code:

```java
assume code is in main()

Listnode<String> n1 = null;
```

→ **Write the code that results in:**