Exam 1

Solutions posted on the course web page
Today

• Exams
• More objects
• For loops
Short Questions?
Quiz
Exam

• Solution set has been posted on the course web page
• Most common problems:
  • Keeping track of types and type conversions
  • Following the instructions for the coding exercises
• [insert histogram]
Primitive Data Types

Primitive data types are the fundamental units of representation of information (they are the atoms!)

• Operations on primitive data types are implemented directly in hardware (most of the time)

• Fixed size

• Parameter values are copied when calling a method

• Allocated on the stack (private memory area for each method) or the heap (a shared memory area)
Objects

Objects are constructed from primitives and other objects

- Sizes vary
  - Different instances of the same class can be different
  - An instance can change its size at run-time

- References are copied when calling a method, but it is the same object being referred to inside and outside the method

- Allocated on the heap only using a *constructor*

- A class has its own set of methods associated with it
Immutable vs Mutable Objects

• Immutable objects:
  • The constructor call entirely determines the “value” of the object
  • After construction: cannot be changed – ever!

• Mutable objects:
  • Some methods can change the object after it is constructed
Object Example I

Write a method that returns the past tense of a verb

• Assume regular verbs
• Verbs can end with any letter
Object Example II

Write a method that \textit{turns} a verb into the past tense of itself

• Assume regular verbs
• Verbs can end with any letter
• The original object should be modified
While Loops

while<LOOP CONDITION>)
{
    <STATEMENTS>
}

Loops

• Many of the while loops that we have written involve some index variable that is changed in a consistent way every time we move through the loop

• We would like some consistent way of writing such loops
For Loops

• For loops introduce initialization and update statements.

```plaintext
for(<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
{
    <STATEMENTS>
}
```
For Loops

• For loops introduce initialization and update statements.

```
1
for (<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
{
    <STATEMENTS>
}
```
For Loops

• For loops introduce initialization and update statements.

for(<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
{
    <STATEMENTS>
}

1 2
For Loops

• For loops introduce initialization and update statements.

```plaintext
1  2: false
for (<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
{
  <STATEMENTS>
}
```

3
For Loops

- For loops introduce initialization and update statements.

```plaintext
1 2:true
for (<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
{
    <STATEMENTS>
3
}
```
For Loops

• For loops introduce initialization and update statements.

```
1 true
for(<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
{
    <STATEMENTS>
}
```
For Loops

• For loops introduce initialization and update statements.

\[
\text{for(} \langle \text{INITIALIZATION} \rangle; \ \langle \text{LOOP CONDITION} \rangle; \ \langle \text{UPDATE} \rangle \text{)} \{ \langle \text{STATEMENTS} \rangle \}
\]
For Loops

• For loops introduce initialization and update statements.

```
1: true  
2: true
5: true
4

for (<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
{
  <STATEMENTS>
}
```
For Loops

• For loops introduce initialization and update statements.

   for (<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
   {
       <STATEMENTS>
   }

   1  2:true  5:true  4  7

   for (<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
   {
       <STATEMENTS>
   }
For Loops

• For loops introduce initialization and update statements.

```plaintext
for (<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
{
    <STATEMENTS>
}
```
For Loops

- For loops introduce initialization and update statements.

```c
for(<INITIALIZATION>; <LOOP CONDITION>; <UPDATE>)
{
  <STATEMENTS>
}
```

1: true 5: true 4 7: false
Loop Problem

Write a method that will indicate whether all of the characters in a string are lower case

• What is the method prototype?
Loop Example I

Write a method that will indicate whether all of the characters in a string are lower case

• What is the method prototype?
• What is the method implementation?
Loop Example II

• Quiz question
Summary

• For loops: yet another way to implement a loop
  • No additional functionality beyond while or do-while loops
  • Consistent way of writing certain forms of loops
Wrap Up

Due:
- Project 1: Goes out today
- HW 4: due Wednesday
- HW 5: released on Wednesday

Next time:
- Class methods & generics