Midterm

- Monday, October 30, 1:00 PM
- In class
- You may use the textbook as a reference
- Chapters 1-6 (excluding graphics sections)
- Anything from readings and assignments

Midterm Topics

- Object Oriented concepts
- Classes and methods
- Java syntax, data types
- Java control flow, expression evaluation
- Interfaces
- Number base conversion
Midterm Question Format

- Multiple choice questions
- Programming questions
- Calculation questions

Example Questions

Of the following types, which one cannot store a numeric value?

- a) byte
- b) float
- c) boolean
- d) int
Example Questions

Which of the following are Object Oriented principles?

a) encapsulation  
b) data hiding  
c) abstraction  
d) all of the above

Example Questions

If x is an int and y is a float, which one of the following is not a legal assignment statement?

a) \( y = x; \)  
b) \( x = y; \)  
c) \( y = (\text{float}) x; \)  
d) \( x = (\text{int}) y; \)
Example Questions

Assume that \( x \), \( y \), and \( z \) are all ints equal to 50, 20, and 6. What is the value of \( x \div y \div z \) ?

a) 16  
b) 12  
c) 0  
d) A syntax error as this is syntactically invalid  
e) A run-time error since this is a division by 0

Example Questions

If we have the statement

\[ \text{String s = "Hello world";} \]

What is returned by \( s \text{.charAt(1)} \) ?

a) 'H'  
b) 'e'  
c) 'l'  
d) "Hello"
Example Questions

Suppose you have three String variables a, b, c. The statement  
\[ c = a + b; \]  
can also be achieved by:

a)  \[ c = a.\text{length}() + b.\text{length}(); \]
b)  \[ c = (\text{int}) a + (\text{int}) b; \]
c)  \[ c = a.\text{concat}(b); \]
d)  \[ c = b.\text{concat}(a); \]
e)  \[ c = \text{String.concat}(a,b); \]

Example Questions

Assume that q, x, y, and z are int variables with \( x = 1, y = 10, z = -3 \). Which of the following is true after this statement is executed?

\[ q = (x++ \ast y--) + ++z; \]

a)  \( q == 7 \)
b)  \( q == 16 \)
c)  \( q == 22 \)
d)  \( q == 8 \)
Example Questions

Assume that q, x, y, and z are int variables. Rewrite this statement as a sequence of simple statements without the increment and decrement operators, and with at most one operation in each statement.

\[ q = (x++ \ast y--) + ++z; \]

Example Questions

What value will z have after the statement:

\[ \text{float } z = 5 / 10; \]

a) 0
b) 0.5
c) 5.0
d) 2.0
e) none of the above, a compile-time error arises because \( z \) is a float and 5 / 10 is an int
Example Questions

Assume that x is an int variable with x = 1. What will be the value of x after this loop terminates? \texttt{while (x < 100) x *= 2;}

a) 2  
b) 101  
c) 64  
d) 128

Base Conversions

Convert from binary to octal:  
01111010

Convert from binary to hexadecimal:  
01111010
Example Questions

Fill in the code in a method to extract the first letter of each word in a String. A word consists just of letters. You may use the static method Character.isLetter(ch) which returns true if the character ch is a letter.

```java
String initials(String s) {
    // Add code to extract the first letter of each word.
}
```
Example Questions

Fill in the code for classes Part and Labor that implement the interface Billable.

public interface Billable {
    public final NumberFormat fmt =
        NumberFormat.getCurrencyInstance();

    // Compute charge for this item
    public double charge();

    // Realize the item as a String
    public String toString();
}

Interface Question Continued..

This driver shows use of Part and Labor.

public class BillTest {
    public static void main(String args[]) {
        Billable p1 = new Part("oil filter", 1, 5.95);
        Billable p2 = new Part("oil", 5, 1.79);
        Billable l = new Labor(.5, 25.00);

        double total = 0.0;
        total += p1.charge();
        total += p2.charge();
        total += l.charge();

        System.out.println("Total charge is "+
            Billable.fmt.format(total));
        System.out.println("Detail of bill:");
        System.out.println(p1 + "\n" + p2 + "\n" + l);
    }
}
Interface Question Continued..

Fill in all needed methods of Part.

```java
public class Part implements Billable {
    private String desc;    // Description of item
    private int quantity;   // Number of items
    private double price;   // Item price

    public String toString() {
        return desc + ": " + quantity + " at " + fmt.format(price);
    }
}
```

Interface Question Continued..

Fill in all needed methods of Labor.

```java
public class Labor implements Billable {
    private double hours;   // Hours of labor
    private double rate;    // Hourly labor rate

    public String toString() {
        return "Labor: " + hours + " hours at " + fmt.format(rate);
    }
}
```
Exam Strategy

- Do the multiple choice first
  - Over half of the points
  - Probably easiest
- Pace yourself
- Leave time to check your work
- Relax