Midterm

- Friday, October 31, 11:00 AM
- In class
- Closed book
- Chapters 1-4, 11, and Section 5.5 (Interfaces)
- Anything from readings and assignments

Midterm Topics

- Java syntax
- Java control flow and expression evaluation
- Java data types
- Java classes and methods
- Interfaces
- Recursion
- 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

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 \( x / y / z \)?

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

```
String s = "Hello world";
```

What is returned by `s.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.length() + b.length();`

b) `c = (int) a + (int) b;`

c) `c = a.concat(b);`

d) `c = b.concat(a);`

e) `c = 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?

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

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.

\[ q = (x++ \times y--) + ++z; \]
Example Questions

What value will \( z \) have after the statement:
\[
\text{float } z = 5 \div 10;
\]

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? 
\[
\text{while } (x < 100) x *= 2;
\]

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

Give a recursive definition of the number of ways to draw two cards from a deck of \( n \) cards.

Base case(s):

Recursive case:

Another Recursion Question

Give a recursive definition of the number of subsets of a set with \( n \) elements (including empty set).

Base case(s):

Recursive case:
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.

String initials(String s) { 

}
Example Questions

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

```java
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`.

```java
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