Midterm

- Monday, November 2
- In class
- Text book: Chapters 1-6, and 9-10
- Anything from slides
- Anything from readings and assignments

Midterm Topics

- Java syntax, data types
- Java control flow, expression evaluation
- Object Oriented concepts
- Classes and methods
- Constructors
- Objects and references
- 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
  - 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 = (float) x;
d) x = (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

```java
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?

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

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.

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

\[
q = x \times y; \\
x = x + 1; \\
y = y - 1; \\
z = z + 1; \\
q = q + z; 
\]

Example Questions

What value will z have after the statement:

\[ \text{int } z = 5.0 / 10; \]

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

Base Conversions

Convert from binary to octal:

01111010  172

Convert from binary to hexadecimal:

01111010  7A
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) {
    String result = "";
    for (int i = 0; i < s.length(); ++i) {
        if (Character.isLetter(s.charAt(i)) &&
            (i == 0 || !Character.isLetter(s.charAt(i-1))))
        result += s.charAt(i);
    }
    return result;
}
```

Example Questions

Extract the first letter of each word.

```java
String initials(String s) {
    String result = "";
    for (int i = 0; i < s.length(); ++i) {
        if (Character.isLetter(s.charAt(i)) &&
            (i == 0 || !Character.isLetter(s.charAt(i-1))))
        result += s.charAt(i);
    }
    return result;
}
```
Example Questions

Fill in the code for class Rectangle so that it works with this test driver code.

```java
public static void main(String[] args) {
    // Create two Rectangle objects
    Rectangle rect1 = new Rectangle(4, 11);
    Rectangle rect2 = new Rectangle(7, 7);
    System.out.println("area of rect1 is "+ rect1.area());
    if (rect2.isSquare())
        System.out.println("rect2 is a square");
    System.out.println("rect1 is "+ rect1);
    System.out.println("rect2 is "+ rect2);
    rect1.growByFactor(2.5);
    System.out.println("rect1 is "+ rect1);
}
```

Output:
area of rect1 is 44
rect2 is a square
rect1 is Rectangle with dimensions 4 and 11
rect2 is Rectangle with dimensions 7 and 7
rect1 is Rectangle with dimensions 10 and 27

Class Coding Continued..

class Rectangle {
    private int length, width;
    public Rectangle(int length, int width) {
        this.length = length;
        this.width = width;
    }
    public int area() { return length*width; }
    public boolean isSquare() {
        if (length == width) return true;
        return false;
    }
    public void growByFactor(double factor) {
        length = (int)(length * factor);
        width = (int)(width * factor);
    }
    public String toString() {
        return "Rectangle with dimensions "+ length + " and " + width;
    }
}

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Exam Strategy

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