Midterm

- Monday, November 3
- In class
- Text book: Chapters 1-6, and 9
- 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
- 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 \(a\), \(b\), and \(c\).
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?

```java
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.

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

- a) \(q = x * y;\)
- b) \(x = x + 1;\)
- c) \(y = y - 1;\)
- d) \(z = z + 1;\)
- e) \(q = q + z;\)

Example Questions
What value will \(z\) have after the statement:

```java
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:

\[0111010\]  
\[172\]

Convert from binary to hexadecimal:

\[0111010\]  
\[7A\]

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(char)` which returns true if the character \( \text{ch} \) 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

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);
    rect1.growByFactor(2.5);
    System.out.println("rect1 is " + rect1);
}
```

```java
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;
        else 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;
    }
}
```
Exam Strategy

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