Midterm

- Wednesday, February 11
- 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
Which of the following are Object Oriented principles?

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

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

```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) \(c = (\text{int}) a + (\text{int}) b;\)

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

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

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?

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

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.

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

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

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:

\[ 01111010 \rightarrow 172 \]

Convert from binary to hexadecimal:

\[ 01111010 \rightarrow 7A \]
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.

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.

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 Rectangle with dimensions 4 and 11");
    System.out.println("rect2 is Rectangle with dimensions 7 and 7");
    rect1.growByFactor(2.5);
    System.out.println("rect1 is Rectangle with dimensions 10 and 27");
}
```

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
```
Exam Strategy

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