This exam is to be taken by yourself with closed books, closed notes, no electronic devices. You are allowed both sides of an 8.5"x11" sheet of paper handwritten by you.
(Partial) Operator Precedence Table

<table>
<thead>
<tr>
<th>Operators</th>
<th>Associativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>! ++ --</td>
<td>right to left</td>
</tr>
<tr>
<td>* / %</td>
<td>left to right</td>
</tr>
<tr>
<td>+ -</td>
<td>left to right</td>
</tr>
<tr>
<td>&lt; &lt;= &gt; &gt;=</td>
<td>left to right</td>
</tr>
<tr>
<td>== !=</td>
<td>left to right</td>
</tr>
<tr>
<td>&amp;&amp;</td>
<td>left to right</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>=</td>
<td>right to left</td>
</tr>
</tbody>
</table>

Which of the following **are not** valid Java identifiers? (Circle your answer(s).)

- quarter_.25
- Half-Time
- 25Cents
- double
- quarter25
- SuperBowl_XLV
- QUARTER_25
- string_cheese

What does the statement `System.out.println( "The answer is: " + 3 + (2 + 1) );` print?
________________________________________

What does the statement `System.out.println( 2 <= 3 );` print?
________________________________________

What does `int x = 22 % 3; System.out.println( x );` print?
________________________________________

What does the statement `System.out.println( "The answer is: " + 1 + 2 + 3 );` print?
________________________________________

What gets printed?

```java
public class M2 {
    public static void main( String[] args ) {
        System.out.println( 6 + 7 % 11 + 9 * 10 );            _________
        System.out.println( -1 + 2 - 3 * 5 / 4 );            _________
    }
}
```

What is printed by the following code?

```java
int foo = 37;
int bar = 37;
boolean foobar = ( foo == bar );
System.out.println( foobar );                     _________
bar = 42;
System.out.println( foobar );                     _________
System.out.println( foo == bar );                  _________
```
Using only the statements below, select the order of the statements to draw an H such that the width of the H is size pixels and the height of the H is twice size pixels. Do not worry about where it is drawing. Assume the turtle is pointing up when the method is called, the pen is down, and it is positioned at the upper left corner of where we want to draw the H. Start drawing the H at the upper left corner of the H. Have the turtle end at the bottom right corner of the H.

Write the letter corresponding to each statement in the correct order to draw an H. Do it in exactly 9 statements. Hint: start with one of the forward() methods.

```java
public void drawH( int size )
{
    ____
    ____
    ____
    ____
    ____
    ____
    ____
    ____
    ____

}
```

What gets printed?

```java
public class M3
{
    public static void main( String[] args )
    {
        int fire = 5, air = 5;
        fire = fire + (air * 2);
        System.out.println( "fire = " + fire );

        fire = 6 + air++;
        System.out.println( "fire = " + fire + "; air = " + air );

        fire = 15;
        air = --fire - 4;
        System.out.println( "fire = " + fire + "; air = " + air );
    }
}
```
What gets printed?

```java
public class M5
{
    public static void main( String[] args )
    {
        final int MAX = 5;
        int i = -1, j = -1;
        for (i = 3; i < MAX; ++i )
        {
            for (j = 1; j < MAX; j = j + 2 )
            {
                System.out.println( i + " " + j);
            }
        }
        System.out.println( i + " " + j);
    }
}
```

What gets printed if the value of the actual argument passed to this method is 5?

```java
public void m6( int x )
{
    int y = 0;
    if ( x <= 1 )
        y = 3;
    else if ( x >= 2 )
        y = 5;
    else if ( x == 3 || x >= 4 )
        y = 7;
    else
        y = 9;
    System.out.println( y );
}
```

What gets printed if the value of the actual argument passed to this method is 5?

```java
public void m6( int x )
{
    int y = 0;
    if ( x <= 1 )
        y = 3;
    if ( x <= 2 )
        y = 5;
    if ( x == 3 || x <= 4 )
        y = 7;
    else
        y = 9;
    System.out.println( y );
}
```

What gets printed if the value of the actual argument passed to this method is 2?

```java
public void m6( int x )
{
    int y = 0;
    if ( x <= 1 )
        y = 3;
    if ( x <= 2 )
        y = 5;
    if ( x == 3 || x <= 4 )
        y = 7;
    else
        y = 9;
    System.out.println( y );
}
```

What gets printed?

```java
public class M7
{
    public static void main( String[] args )
    {
        int x = 8;
        int y = 5;
        System.out.println( ++x < y );
        System.out.println( true && !(x <= y) );
        System.out.println( 4 + x < y );
        System.out.println( false || (y <= 8) );
    }
}
```
The following is code using a for loop. Write the equivalent using a while loop.

```java
int a = 1;
int i;
for ( i = 13; i > a; i-- )
{
    a = a + a;
}
```

What order are pixels changed given this code in Picture.java (assuming all variables are correctly defined and set)? Write the letter of the correct order here: ______

Pixel p;
for ( int x = 0; x < this.getWidth(); x++ )
{
    for ( int y = 0; y < this.getHeight(); y++ )
    {
        p = getPixel( x, y );
        p.setColor( Color.Black );
    }
}

A) L->R;Top->Down  B) L->R;Bottom->Up  C) R->L;Top->Down  D) R->L;Bottom->Up
E) Top->Down;L->R  F) Bottom->Up;L->R

Fill in the blanks so the code will change pixels in the order described by pattern C above.

Pixel p;
for ( int ___ = _________________________; ___ _____ _________________________; _____ )
{
    for ( int ___ = _________________________; ___ _____ _________________________; _____ )
    {
        p = getPixel( x, y );
        p.setColor( Color.Black );
    }
}
```
What gets printed by the following code? _______

```java
int x = 13;
if ( x > 7 )
{
    x += 3;  // Same as x = x + 3;
}
else
{
    x += 6;
}                       
System.out.println( x );
```

What gets printed by the following code? _______

```java
int x = 13;
if ( x < 7 )
{
    x += 3;  // Same as x = x + 3;
}
else if ( x <= 10 )
{
    x += 6;
}                           
System.out.println( x );
```

What gets printed by the following code? _______

```java
int x = 13;
if ( x < 7 )
{
    x += 3;  // Same as x = x + 3;
}
else
{
    x += 6;
}                           
System.out.println( x );
```

What gets printed by the following code? _______

```java
int x = 13;
if ( x > 7 )
{
    x += 2;  // Same as x = x + 2;
}
else if ( x >= 10 )
{
    x += 6;
}                           
System.out.println( x );
```

What gets printed by the following code? _______

```java
int x = 13;
if ( x > 7 )
{
    x += 3;  // Same as x = x + 3;
}
else if ( x >= 10 )
{
    x += 4;
}                           
System.out.println( x );
```

What gets printed by the following code? _______

```java
int x = 13;
if ( x < 7 )
{
    x += 3;  // Same as x = x + 3;
}
if ( x >= 15 )
{
    x += 4;
}                           
System.out.println( x );
```

What gets printed by the following code? _______

```java
int x = 13;
if ( x < 7 )
{
    x += 3;  // Same as x = x + 3;
}
if ( x >= 12 )
{
    x += 4;
}                           
System.out.println( x );
```

What gets printed by the following code? _______

```java
int x = 13;
if ( x < 7 )
{
    x += 3;  // Same as x = x + 3;
}
if ( x >= 15 )
{
    x += 4;
}                           
System.out.println( x );
```
Trace the following program and specify its output.

```java
public class Trace {
    public static void main(String[] args) {
        foo3();
        System.out.println("main1");
        foo2();
        System.out.println("main2");
        foo1();
        System.out.println("main3");
        foo2();
    }

    public static void foo1() {
        foo2();
        System.out.println("A");
    }

    public static void foo2() {
        System.out.println("B");
        foo3();
        System.out.println("C");
    }

    public static void foo3() {
        System.out.println("D");
    }
}
```

How many times does the body of this loop execute? ________
```java
for (int i = 8; i >= 0; --i) {
    System.out.println("CSE8A Rocks! " + i);
}
```

With regards to the loop above, what is the last value of `i` that is printed? ________

How many times does the body of this loop execute? ________
```java
int i;
for (i = 0; i < 13; ++i) {
    System.out.println("CSE8A Rocks! " + i);
}
System.out.println(i);
```

With regards to the loop above, what is the last value of `i` that is printed inside the loop? ________

What is the value of `i` that is printed in the statement after the loop? ________
What will be output from the following code:

```java
int x = 2;
int y = 4;
while ( x <= 4 && y < 10 )
{
    System.out.println( x + " " + y );
x++;
y++;
}
System.out.println( x + " " + y );
```

What will be output from the following code:

```java
int x = 6;
int y = 2;
while ( x > 3 || y >= 1 )
{
x--;
y--;
System.out.println( x + " " + y );
}
System.out.println( x + " " + y );
```

Which are valid constructor headers for a class Student that has two instance variables:

String name;
int id;

Circle all that are appropriate:

A) public void Student()   E) public Student( String name, int id )
B) public Student()    F) public Student( int id )
C) public TheStudent()   G) public String Student( String name )
D) public Student( String name )   H) public int Student( int id )

Write the accessor/getter method for the id field in class Student described above:

```java
public ____________ _________________()
{
    __________________  __________________ ;
}
```
Which of the following loops may cause an ArrayIndexOutOfBoundsException exception? Circle all the correct answers. There may be more than one correct answer. [Correct +1; Incorrect: -1; No negative score]

A) for ( int i = -1; i < this.getWidth(); i++ )

B) for ( int i = 0; i <= this.getWidth(); i++ )

C) for ( int i = this.getWidth(); i >= 0; i-- )

D) for ( int i = this.getWidth() - 1; i >= 0; i-- )

E) for ( int i = 100; i < this.getWidth(); i++ )

F) for ( int i = this.getWidth() - 100; i > -1; i-- )

What gets printed by this code?

```java
public class Page8 {
    public static void main( String[] args ) {
        int[] array = { 35, 95, 125, 105, 125, 105, 65, 35, 95, 65 };
        int a = 42, b = 0;
        for ( int i = 0; i < array.length; ++i ) {
            int foo = array[i];
            if ( foo > a ) {
                a = foo;
                b = i;
            }
        }
        System.out.println(a + "\," + b);
    }
}
```

Put your answer here: __________

What is printed if the line `if ( foo > a )` was changed to `if ( foo <= a )`? __________

What is printed if the line `if ( foo > a )` was changed to `if ( foo >= a )`? __________

What is printed if the line `if ( foo > a )` was changed to `if ( foo < a )`? __________

What is printed if the line `if ( foo > a )` was changed to `if ( foo == a )`? __________

What is printed if the line `if ( foo > a )` was changed to `if ( foo != a )`? __________
Matching:

_____ If uninitialized, has no default value (garbage)
_____ Must not have a return type in its header
_____ Return type for accessors/getters
_____ Field/Data in an object
_____ Code to initialize a newly created object
_____ Must be the same name as the class name
_____ Refers to the object being sent a message inside a method
_____ Messages sent to objects
_____ A way to create a new object
_____ Must have a return type as part of its header
_____ A sometimes "better" return type for mutators/setters
_____ Can only be accessed by its simple name, no reference qualifier
_____ Most methods and constructors should be this access mode
_____ By Java naming convention, starts with an uppercase letter
_____ Methods or constructors that have the same name but differ in the number, type, or order of parameters
_____ Most instance variables should be this access mode

1) public
2) local variable
3) private
4) instance method
5) class / class name
6) boolean
7) instance variable
8) new operator
9) this
10) static variable
11) Object
12) void
13) type of the instance variable accessed
14) constructor
15) overload

[You do not need to use all letters. Some letters will need to be used more than once.]

What is the default initial value of a local variable? ________________
What is the default initial value of an instance variable that is defined as a boolean? __________
What is the default initial value of an instance variable that is defined as an object reference? __________
What is the default initial value of an instance variable that is defined as a double? __________
Assume there is a class named Student with an instance variable defined as

```java
String name;
```

Write the mutator/setter method for the instance variable `name` above. Assume no return value or data checks.

```java
public ____________ ___________________( String name )
{
    ___________________ = __________________;
}
```

Will the following code compile? ___________
If not, what change do you need to make to the method header (not the body) so that it will compile? Explain. Be specific.

```java
public double test( int x )
{
    if ( x )
    {
        System.out.println( "In test" );
    }
    return 42.42;
}
```

-------------------
Will the following code compile? ___________
If not, what change do you need to make to the method header (not the body) so that it will compile? Explain. Be specific.

```java
public boolean test( int x )
{
    System.out.println( "In test" );
    return x + x;
}
```

What is Rick's favorite Pokemon?
Scratch Paper