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.
What gets printed?

public class F2
{
    public static void main(String[] args)
    {
        System.out.println(-1 + 2 - 3 * 10 % 4);  //
        System.out.println(2 * 7 - 11 / 9 + 10);  //
    }
}

What gets printed?

public class F3
{
    public static void main(String[] args)
    {
        int fire = 10, air = 2;
        fire = fire * (air + 5);
        System.out.println("fire = " + fire); //
        fire = 5 - air--; System.out.println("fire = " + fire + "; air = " + air); //
        fire = 5; System.out.println("fire = " + fire + "; air = " + air); //
        air = ++fire + 4; System.out.println("fire = " + fire + "; air = " + air); //
    }
}

What is printed by the following code?

int foo = 42;
int bar = 42;
boolean foobar = (foo == bar);
System.out.println(foobar); //
foo = 37;
System.out.println(foobar); //
System.out.println(foobar); //

Fill in the blank so the code will print out 2

```java
System.out.println( (____________) (5.0 / 2.0) );
```

What does the statement `System.out.println( "The answer is: " + 5 + 7 + 2 );` print?

__________________________________________

What does the statement `System.out.println( "The answer is: " + 5 + (7 + 2) );` print?

__________________________________________

What does the statement `System.out.println( "The answer is: " + (5 + 7) + 2 );` print?

__________________________________________

What does the statement `System.out.println( !(2 > 3) );` print?

__________________________________________

What does `int x = 15 % 3; System.out.println( x );` print?

__________________________________________

What is the full name of the file that this Java code below must be saved as? ____________________________

```java
public class Cafe { /* Body of the class here. */ }
```

What is stored in the memory location allocated for the variable x for the following: (Circle the correct answer.)

```java
String x = "-99";
```

A) x  
B) a reference (or address in memory) to where the string "-99" is stored  
C) the value -99  
D) int

What is stored in the memory location allocated for the variable x for the following: (Circle the correct answer.)

```java
int x = -99;
```

A) x  
B) a reference (or address in memory) to where the value -99 is stored  
C) the value -99  
D) int
In the code for `drawSquare( int size )` discussed in class, we used lines like

```java
    this.forward( size );
```

If `drawSquare()` is invoked as

```java
    koko.drawSquare( 42 );
```

what does this refer to? (Circle the correct answer.)

A) this shape  
B) this square  
C) the object referenced by koko  
D) this size

What does the following code do? Give a high level answer in plain English words. Assume this method is stored in the file Picture.java

```java
public void fubar()
{
    Pixel[] pixelArray = this.getPixels();
    for ( Pixel p : pixelArray )
    {
        p.setRed( 255 );
        p.setGreen( 255 );
        p.setBlue( 255 );
    }
}
```

Which of the following correctly swaps two values `a` and `b`? Write the letter of the correct code here: ______

A) `a = b`
B) `tmp = a`  
   `b = tmp;`
C) `tmp = a`  
   `b = a`  
   `a = b`

D) `tmp = a`  
   `b = a`  
   `a = tmp;`
E) `tmp = a`  
   `a = b`  
   `b = tmp;`
F) `tmp = b`  
   `a = b`  
   `b = tmp;`

Which of the following are not valid Java identifiers? (Circle your answer(s).) [+1 – correct; -1 – incorrect; No negative score]

A) `this&that`  
B) `thisRthat`  
C) `This_2_That`  
D) `integer`
E) `nine2five`  
F) `n!ne_2_5`  
G) `9_2_5`  
H) `int`
Fill in the blanks below so the code correctly gets the height of a Picture object referenced by a variable named var1 and stores it in the variable named var2. Be sure to fill in the correct type of variable var2.

```java
Picture var1 = new Picture();
_________ var2; // Fill in the type variable var2 should be defined as.
var2 = ___________________; // Fill in the right side of this assignment stmt
// to get the height of the Picture object var1
// references.
```

The following is a for loop. Write the equivalent as a while loop.

```java
int i;
for ( i = 0; i < 42; ++i )
{   
   System.out.println( i * i );
}
```

Which of the following are instance methods? Circle your answers. (+1 if correct; -1 if incorrect. No neg. pts.)

- pictureObj.show();
- Math.abs( -3 );
- turtle1.turnLeft();
- FileChooser.pickAFile();
- soundObj.play();
- ColorChooser.pickAColor();

```
Assume there is an array properly defined and a variable named abc references this array.
```

Write the expression to access the first element in this array? __________________________________

Write the expression to access the last element in this array?  __________________________________

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:   ______

```java
int width = … ; int height = … ;
Pixel p;
for ( int j = 0; j < height; j++ )
{   
   for ( int i = 0; i < width; i++ )
   {   
      p = getPixel( i, j );
      p.setColor( Color.Black );
   }
```

A) L->R;Top->Down

B) L->R;Bottom->Up

C) Bottom->Up;L->R

D) Top->Down;L->R
Trace the following program and specify its output.

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

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

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

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

How many times does the body of this loop execute? _______

```java
int i;
for ( i = 18; 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? _______

What is the value of i after the loop terminates? _______

Which is the correct if statement to make this code change the top half of a Picture to black? _______

```java
class Picture {
    public void paintItBlack()
    {
        Pixel pixel = null;

        for ( int y = 0; y < getHeight(); y++ )
        {
            for ( int x = 0; x < getWidth(); x++ )
            {
                /* MISSING IF STATEMENT */
                {
                    pixel = this.getPixel( x, y );
                    pixel.setColor( Color.BLACK );
                }
            }
        }
    }
}
```

A) if ( y < getHeight() / 2 )
B) if ( x < getWidth() / 2 )
C) if ( y < getWidth() / 2 )
D) if ( x < getHeight() / 2 )
The following method mirrors a Picture vertically left to right. This is a Picture that we are applying the mirroring.

```java
public void mirrorVertically()
{
    int mirrorPoint = this.getWidth() / 2;
    Pixel leftPixel = null;
    Pixel rightPixel = null;
    Pixel mirrorPixel = null;

    for ( int y = 0; y < this.getHeight(); ++y )
    {
        for ( int x = 0; x < mirrorPoint; ++x )
        {
            leftPixel = this.getPixel( x, y );
            rightPixel = this.getPixel( this.getWidth() - 1 - x, y );
            mirrorPixel = this.getPixel( mirrorPoint, y );
            /* MISSING LINE */
        }
    }
}
```

Which missing line of code will correctly mirror this Picture vertically left to right? 

A) mirrorPixel.setColor( leftPixel.getColor() );  
B) mirrorPixel.setColor( rightPixel.getColor() );  
C) rightPixel.setColor( leftPixel.getColor() );  
D) leftPixel.setColor( rightPixel.getColor() );  
E) rightPixel.setColor( mirrorPixel.getColor() );  
F) leftPixel.setColor( mirrorPixel.getColor() );

Method overloading allows for more than one method with the same _________ as long as the _____________ are different.

What gets printed by the following code? 

```java
int x = 12;
if ( x > 7 )
{
    x += 3;  // Same as x = x + 3;
}
if ( x >= 15 )
{
    x += 6;
}
System.out.println( x );
```

What gets printed by the following code? 

```java
int x = 12;
if ( x > 7 )
{
    x += 3;  // Same as x = x + 3;
}
else if ( x >= 15 )
{
    x += 6;
}
System.out.println( x );
```

What will be output from the following code:

```java
int x = 4;
int y = 2;

while ( x < 10 && y <= 3 )
{
    System.out.println( x + " " + y );
    x++;
    y++;
}
System.out.println( x + " " + y );
```
What will be output from the following code:

```java
def getBatches
    int x = 2;
    int y = 0;
    while ( x < 5 || y <= 1 )
    {
        x++;
        y++;
        System.out.println( x + " " + y );
    }
    System.out.println( x + " " + y );
```

Which of the following loops will not cause an ArrayIndexOutOfBoundsException? Circle all the correct answers. There may be more than one correct answer. [Correct +1; Incorrect: -1; No negative score]

A) for ( int i = 0; i <= this.getWidth(); i++ )
B) for ( int i = this.getWidth(); i > 0; i-- )
C) for ( int i = this.getWidth() - 1; i >= 0; i-- )
D) for ( int i = 8; i < this.getWidth(); i++ )
E) for ( int i = this.getWidth() - 8; i > 0; i-- )
F) for ( int i = -1; i < this.getWidth(); i++ )

Given the following code:

```java
public void guess()
{
    int array[] = { 20, 50, 30, 20, 100, 0, 40, 0 };
    int a = 200;
    int 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 );
    }
}
```

What gets printed? ______________

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 )`? ______________
Will the following code compile? ___________
If no, what change do you need to make to the method header (not the body) so that it will compile? Explain. Be specific.
If yes, explain why.

```java
public double test( int x )
{
    return x * x;
}
```

-------------------

Will the following code compile? ___________
If no, what change do you need to make to the method header (not the body) so that it will compile? Explain. Be specific.
If yes, explain why.

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

What gets printed?

```java
public class F5
{
    public static void main( String[] args )
    {
        final int MAX = 4;
        int i = -1, j = -1;

        for (i = 2; i < MAX; ++i )
        {
            for (j = 3; j <= MAX; ++j )
            {
                System.out.println( i + " " + j );
            }
        }
        System.out.println( i + " " + j );
    }
}
```
public class F7 {
    public static void main( String[] args )
    {
        int x = 5;
        int y = 8;

        System.out.println( false || (y >= 8) );
        System.out.println( ++x < y );
        System.out.println( true && !(x <= y) );
        System.out.println( 4 + x < y );
    }
}

What gets printed?

What gets printed if the value of the actual argument passed to this method is 0? _______

public void f6( 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 0? _______

public void f6( 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 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? _____________