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Section 1: Basics Circle or write the correct answer to each question.

1.1. (2 pts) What would Processing do as a result of this command?

```
line(width, 0, 0, height);
```

- A. Draw a line from the lower right corner to the upper left corner of the window
- B. Draw a line from the upper right corner to the lower left corner of the window
- C. Draw a horizontal line through the center of the window
- D. Draw a vertical line through the center of the window

1.2. (2pts) What would Processing draw as a result of this command?

```
ellipse(10, 10, 50, 40);
```

- A. An ellipse that is wider than it is tall.
- B. An ellipse that is taller than it is wide.
- C. A perfect circle with diameter 10.
- D. A perfect circle with radius 10.

1.3. (2 pts) How many times would this code print the text “Hello World”?

```
for (int i=0; i<10; i+=2) {  
  println("Hello World");  
}
```

- A. Ten (10)
- B. Five (5)
- C. Six (6)
- D. None, this is invalid Processing code.

1.4 (2 pts) What value is printed as a result of the following code?

```
int z = 5 / 2;  
println(z);
```

- A. 5
- B. 2
- C. 2.5
- D. None, this code will result in an error.

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Section 2: Operators and Expressions (10 points total)

What is the value of x after the following statements are evaluated?

2.1 (2 pts) `int x = 3;`
 `x++;`

2.2 (2 pts) `double x = 3;`
 `x -= 2;`

2.3 (2 pts) `int x = 11;`
 `x = x % 5;`

2.4 (2 pts) `double y = 10.5;`
 `boolean x = (y > 9);`

2.5 (2 pts) `int y = 0;`
 `boolean x = (y > 0 || y < 0);`

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Section 3: Conditionals (15 pts total)

3.1 (7 pts) Write a conditional expression that would print to the screen “weekday” whenever the integer variable `day` is not equal to 0 or 6.

3.2 (8 pts) Consider a function which toggles (i.e., switches) the value for a global boolean variable that tracks whether a light is on or off. Two people, creatively named A and B, who are claiming to be expert light switchers have written two different implementations of this function, shown below:

```
// the global variable
boolean lightOn = false;
...
void toggleLightA() {
    if (lightOn) {
        lightOn = false;
    } else {
        lightOn = true;
    }
}

// the global variable
boolean lightOn = false;
...
void toggleLightB() {
    if (lightOn) {
        lightOn = false;
    }
    if (!lightOn){
        lightOn = true;
    }
}
```

Are these two implementations equivalent? Are both of the people expert light switchers, or are one or both of them frauds? Why? Explain your answer!

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Section 4: Loops (15 pts total)

4.1 (10 pts) Rewrite the following code, using a `while` loop instead of a `for` loop. The results the two code fragments should be identical.

```
int num = 65;
for (int i=0; i < 4; i++) {
    println(num);
    num = num / 2;
}
println(num);
```

4.2 (5pts) What will be printed by the code fragment in the above question 4.1?

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5. Functions (10 pts) Consider the following code. When this program runs, what will be printed?

```
float x = 10.0;

void setup() {
    test();
    println(x);
}

void draw() { }

void test() {
    float x = 20.0;
    println(x);
}
```

6. Arrays (10 pts) Complete the following function. Be sure to comment your code!

```
/** Prints all the values of the array, one per line
 * @param vals - the array to print
 */
void printArray(float[] vals) {

    // Your code goes here

} // closing brace for printArray()
```

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7: Random Numbers and Debugging (15 pts)

The following program is supposed to draw a red ball at a random location such that the *entire* ball appears on the screen. Instead, sometimes it is drawing the ball so that part of it is off the screen. Show how you can fix this program. Explain your answer!

```
int x;
int y;
int ballDiameter = 10;

void setup() {
  size(500, 500);
  // choose the ball's x and y position randomly
  x = random(width);
  y = random(height);
}

void draw() {
  // draw the ball at the specified location
  fill(255, 0, 0);
  ellipseMode(CENTER);
  ellipse(x, y, ballDiameter, ballDiameter);
}
```

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8: Classes (20 pts)

Write a class called `Box` that has four integer fields named `x`, `y`, `w`, and `h` that represent the `Box`'s location (`x,y`), its width (`w`), and its height (`h`). The `Box` constructor should initialize these fields using four arguments passed into it. The `Box` class has one method called `display()` that draws the `Box` at its location. A start of the class has already been defined for you, along with a program to use the `Box` class. You may use the back of the page if necessary.

```
Box myBox;

void setup() {
    size(500, 500);
    myBox = new Box(random(width), random(height), 40, 30);
}

void draw() {
    myBox.display();
}

class Box {
    // your implementation goes here!!
```

```
} // closing brace for the Box class
```