

Question X: Graphics in Java [10]

For the following questions, assume the Java2D graphics primitives:

Arc2D.Float (x, y, width, height, start, extent, type)

Ellipse2D.Float (x, y, width, height)

Line2D.Float (x1, y1, x2, y2)

Rectangle2D.Float (x, y, width, height)

RoundRectangle2D.Float (x, y, width, height, arcwidth, archeight)

Assume the API methods:

setColor (Color c)

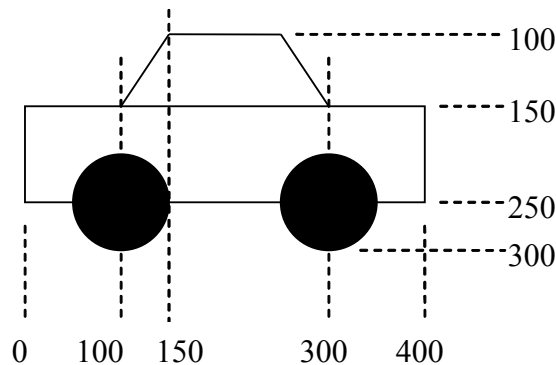
draw (Shape s)

fill (Shape s)

1. Fill in the blanks in the following method to draw a rectangle without using the primitive Rectangle2D shape. [4]

```
void myDrawRectangle ( Graphics2D canvas, float x, float y, float w, float h )
{
    canvas.draw (new Line2D.Float ( _____, _____, _____, _____ ));
    canvas.draw (new Line2D.Float ( _____, _____, _____, _____ ));
    canvas.draw (new Line2D.Float ( _____, _____, _____, _____ ));
    canvas.draw (new Line2D.Float ( _____, _____, _____, _____ ));
}
```

2. Write a method to draw the following figure using the Java2D API. Dimensions are indicated with dashed lines. Where no dimensions are listed, assume the figure is symmetrical. [6]



Question X+1: Number Systems [10]

Show all calculation for the following questions.

1. Convert 120.75_{10} to radix 2. [2]
2. Convert 120.75_{10} to hexadecimal. [1]
3. Use 4-bit 1's complement binary addition to calculate $7_{10} - 3_{10}$. [3]

4. What test must be done to check for an overflow in the above binary addition calculation? [1]
5. Represent the floating point number 18.75_{10} in single-precision IEEE 754 format. [3]

Question X+2: Boolean Algebra and Logic [5]

1. What Boolean operator corresponds to the following truth table? [1]

A	B	F
0	0	0
0	1	1
1	0	1
1	1	1

2. Using a truth table, prove the identity: $A \cdot (B + \bar{B}) = A$ [4]