Name:

CSC 130, Spring 2011 Midterm Exam
50 points total. Answer 5 out of the 7 problems, and cross out the 2 you don't want to count.
Some functions that might be useful:

- `println(x)` – prints its input followed by a newline.

- `random(x)` – generates a random number in the range $[0, x)$.

- `fill(x)` – sets the color used to fill in shapes to a grayscale value given by x, which can range from 0 (black) to 255 (white).

- `ellipse(x, y, diamX, diamY)` – draws an ellipse at location (x, y) that is of horizontal diameter $diamX$ and vertical diameter $diamY$.

1. (10 points) What is the output of the following program?

```
for (int i = 10; i <= 50; i = i + 10) {
  println(i + 5);
}
```

2. (10 points) Suppose the function `randomInt(x)` gives as output a random integer in the range $1, 2, \ldots, x$. Write a program that simulates tossing two 6-sided dice, and prints "You win!" if the sum is 7 or 11. In other words, generate two random numbers in the range from 1 to 6, and print "You win!" if they add to 7 or 11.

3. (10 points) What is the output of the following program?

```
int count = 0;
int x = 1;
int y = 10;
if (x < y) {
  println("x < y");
  count = count + 1;
}
if (y < x) {
  println("y < x");
  count = count + 1;
```

```
      }
      if (x * y == y) {
         println("x * y == y");
         count = count + 1;
      }
      println("Number of true conditions: " + count);
```

4. Suppose that `gas(speed, distance)` is a function that, given input `speed` in mph, and `distance` in miles, gives as output the amount of gas in gallons that you need to travel the given distance at the given speed. Assume the output is of type `float`.

   (a) (5 points) Suppose you want to travel 50 miles at 60 mph, and then 20 miles at 30 mph. Declare a variable that represents the total gas needed, and set it to the correct value using the `gas` function.

   (b) (5 points) Write a loop that will print out the value of gas required to travel 1 mile at 10, 20, 30, 40, 50, 60, 70, and 80 mph.

5. (10 points) The function `mouseClicked()` is called whenever you click the mouse. Fill in the body of the function so that if the mouse is currently in the top half of the screen, the program draws a white circle at the current mouse location, and if the mouse is in the bottom half it draws a black circle at the current mouse location. Here are variables you might need to use:

   • `mouseX`, `mouseY` – coordinates of current mouse position.

   • `width`, `height` – width and height of the screen.

   Also, recall that the pixel coordinates are $(0,0)$ at the top left corner, the y coordinate increases as you go down, and the x coordinate increases as you go left.

```
      void mouseClicked() {
         // Fill in body of function
```

```
    }
```

6. (10 points) Write a truth table for the boolean expression `(x && y) || (x && z) || (y && z)`.

7. (10 points) Consider the following program, which involves a variable `speed` of type `float`, a variable `leftLane` of type `boolean`, and a variable `ageGuess` of type `int`.

```
ageGuess = 30;
if (speed < 55 && leftLane) {
  ageGuess = 60;
  if (speed < 45) {
    ageGuess = 70;
  }
} else {
  if (speed > 100) {
    ageGuess = 16;
  }
}
```

Give values for `speed` and `leftLane` for which the final value of `ageGuess` is (1) 30, (2) 60, (3) 70, and (4) 16.