

Section Handout #3

Variables, Random Numbers, Simple Graphics, and Event Listeners

Portions of this handout by Eric Roberts and Patrick Young.

1. Random circles

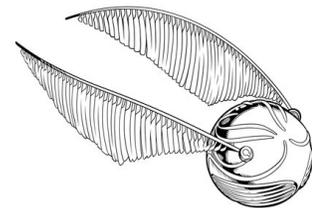
Write a `GraphicsProgram` that draws a set of ten circles with different sizes, positions, and colors. Each circle should have a randomly chosen color, a randomly chosen radius between 5 and 50 pixels, and a randomly chosen position on the canvas, subject to the condition that the entire circle must fit inside the canvas without extending past the edge. The following sample run shows one possible outcome:



On some runs of this program you might not *see* ten circles. Why?

2. The Seeker and the Snitch

Write an interactive `GraphicsProgram` that draws a yellow `GOval`, the snitch, on the screen. The snitch will jump to random locations at set intervals. The idea is the player running your program is the seeker, and they will need to click on the snitch before it moves away to catch it and win the game.



```
/* Constants */
const GWINDOW_WIDTH = 500;
const GWINDOW_HEIGHT = 300;
const TIME_STEP = 1000;
const SNITCH_DIAMETER = 25;

/* Useful functions to look into */
GWindow.addEventListener("click", action);
GWindow.getElementAt(x, y);
setInterval(action, time_interval);
clearTimeout(timer);
GOval.setLocation(x, y);
```

Requirements

1. The snitch must always be completely within the `GWindow`.
2. After catching the snitch:
 - (i) remove the snitch from the `GWindow`
 - (ii) stop any running interval timers
 - (iii) print a message to the user to congratulate them

3. Tracing function execution

For the program below, trace through its execution by hand to show what output is produced when it runs.

```
/*
 * File: calculateBill.js
 * -----
 * This program is designed to test your understanding of parameters,
 * return values, and closures. As such, some lines are intentionally
 * tricky, but we believe in you!
 */
const TAX_RATE = 0.10;
const TIP_RATE = 0.50;
const STANFORD_DISCOUNT = 44;

function main() {      /* program execution starts here */
  var numSalads = 4;
  var numPizzas = 6;
  var finalPrice = calculateBill(numSalads, numPizzas);
  console.log("Your final price is: $" + finalPrice + ".");
}

function calculateBill(numPizzas, numSalads) {
  var total = 0;
  function addSaladCosts(n) {
    total += n * 5;
  }
  function addPizzaCosts(n) {
    if (n < 4) {
      total += 20;
    } else {
      total += 70;
    }
  }
  addSaladCosts(numSalads);
  addPizzaCosts(numPizzas);
  addTax(total);
  console.log("Your total before tip is: $" + total + ".");
  total = addTip(total);
  return total - STANFORD_DISCOUNT;
}

function addTax(total) {
  total *= 1 + TAX_RATE;
}

function addTip(total) {
  total *= 1 + TIP_RATE;
  return total;
}
```