

This is a closed notes, closed book exam. Each problem is worth 1 point unless indicated otherwise.

1. What does the following program print?

```
void setup() {
  int x = 5;
  it = x;
  printIt();
  it = 7;
  printIt();
  printIt();
}

int it;
void printIt() {
  println(it);
  it = 0;
}
```

2. What does the following program print?

```
void setup() {
  int x = 5;
  printVal(x);
  printVal(7);
  println(x);
}

void printVal(int x) {
  println(x);
  x = 0;
}
```

3. Which answer would make the best choice of names for the following function? Circle your choice. The parameter names have been intentionally chosen to be meaningless in order to obscure the intended purpose of the function.

```
boolean func(int a, int b, int c, int d, int e, int f) {
  return (a > c) && (a < (c+e)) && (b > d) && (b < (d+f));
}
```

- a. IsTriangle   b. isRect   c. inTriangle   d. inRect   e. inOrder

4. (2 points) What is printed by the following program?.

```
void setup() {
  func1(1);
  func2(2);
  func2(func3(3));
}

void func1(int x) {
  println("func1 " + x);
}

void func2(int x) {
  println("start func2");
  func1(x);
  println("end func2");
}

int func3(int x) {
  println("func3 " + x);
  return x*10;
}
```

5. (2 points) Write a function that computes  $x^n$ . Assume that both  $x$  and  $n$  are integers and that  $n$  is greater than or equal to 0. The function should return a value (e.g. like the `dist()` function) and not print anything.

6. (3 points) Fill in the blanks so this program creates two balls. Both should start at the top of the screen with zero velocity and then fall according to gravity as specified in the Ball class. ball1 should be 1/4 of the width from the left and ball2 should be 1/4 of the width from the right. They should each be 10 pixels in diameter.

```
Ball ball1, ball2;
float gravity = 0.1;

void setup() {
  size(400, 400);

  ball1 = _____;

  ball2 = _____;
  fill(255,0,0);
}

void draw() {
  background(255);

  _____;
  _____;
  _____;
  _____;
}

class Ball {
  float x, y, xVel, yVel;
  int diam;

  Ball(float xStart, float yStart, float xV, float yV, int diameter) {
    x = xStart;
    y = yStart;
    xVel = xV;
    yVel = yV;
    diam = diameter;
  }

  void update() {
    // check if hit the ground so need to reverse the velocity
    if (y > height-diam/2) {
      yVel = -yVel;
    }
    // adjust position based on velocity
    y = y + yVel;
    x = x + xVel;

    // adjust the velocity - increasing due to gravity
    yVel = yVel + gravity; // always accelerate down

    // add some drag
    yVel = yVel*0.99;
  }

  void draw() {
    // draw the ball
    ellipse(x, y, diam, diam);
  }
}
```