1 If `dx` holds the horizontal speed a particular element should travel from frame to frame for a given program, write a code fragment to reverse its horizontal direction *without* using a conditional. (3)

2 Explain why variables whose changes need to persist from frame to frame should be declared *outside* the `draw()` method. (3)

3 The following code fragment produces an error. Why do you think Processing prohibits you from creating a program with a mixture of "active" and "static" mode elements? (5)

```
void setup() {
  size(250, 250);
  background(255);
}

ellipse(125, 125, 50, 50);
```

4 Write a program that will draw a small circle in the center of the window and gradually increase its size over time. (5)

5 Write a program that will draw a 10×10 box in the upper left-hand corner of the window and animate the box moving along the window's edge. (10)
Note: Your program should work regardless of window size and should represent an "infinite" loop. That is, the box should continue travelling around the edge of the window until the program is closed.

6 The following program is designed as a very simple simulation of gravity. (20)

```
float ballHeight = 0;      // starting height of the ball
float speed = 0, g = 0.1;  // current speed of the ball and acceleration due to gravity
float dampening = -0.8;    // dampening effect for the ball

void setup() {
  size(100, 250);
}

void draw() {
  // clear the screen
  background(255);
  // draw the ball
  fill(0);
  ellipse(width / 2, ballHeight, 10, 10);

  // modify the ball's height
  ballHeight += speed;
  // increase the speed of the ball due to gravity
  speed += g;

  // bounce!
  if (ballHeight > height) {
    speed *= dampening;
    ballHeight = height;
  }
}
```

Run the program a few times with different values for `g` and `dampening` and answer each of the following questions.

(a) Explain what effect `dampening` has on the ball.

(b) What would happen if `dampening` were set to a positive value? To -1? Explain each of these.

(c) Explain why `g` is set to a fairly small number. What happens if it is set to a larger number, such as 5?

(d) Explain why the ball never comes to a `rest`. How would you fix this issue?