

This is a closed notes, closed book exam. **Caution!** Problems that look familiar may have small changes so read them carefully. Don't just assume it is the exact same example done in class, in review questions, or from a previous quiz.

```
int stairX, stairY;
int boxSize = 20;
void setup() {
  size(200, 200);
  stairX = width;
  stairY = height;
}
void draw() {
  background(255);
  int ystart = stairY;
  if (stairX < mouseX || stairY < mouseY) {
    stairX = width;
    stairY = height;
  }
  for (int x = stairX; x < width; x = x + boxSize) {
    fill(x);
    for (int y = ystart; y < height; y = y + boxSize) {
      rect(x, y, boxSize, boxSize);
    }
    ystart = ystart + boxSize;
  }
  if (frameCount % 30 == 0) {
    stairX = stairX - boxSize;
    stairY = stairY - boxSize;
  }
}
```

- Which of these statements is true for the program above?
 - The leftmost columns are darker than the rightmost columns.
 - The rightmost columns are darker than the leftmost columns.
 - The topmost rows are darker than the lower rows.
 - The lower rows are darker than the top rows.
 - The shade of the lower rightmost square changes from frame to frame.
- Which of these statements is true for the program above if the mouse is at the point (160,40)?
 - The "staircase" will increase in size each 30 frames until the upper left box is near (160,160), then repeat.
 - The "staircase" will increase in size each 30 frames until the upper left box is near (40,40), then repeat.
 - A column will appear with its upper left corner near (160,160). Each 30 frames another column will be added to the right until the "staircase" reaches down to the lower right corner, then this will repeat.
 - A column will appear with its upper left corner near (40,40). Each 30 frames another column will be added to the right until the "staircase" reaches down to the lower right corner, then this will repeat.
 - A column will appear with its upper left corner near (160,40). Each 30 frames another column will be added to the right until the "staircase" disappears off of the display, then this will repeat.

- How would the behavior of the program change if the for loops above were replaced by this code

```
for (int x = stairX; x < width; x = x + boxSize) {
  fill(x);
  for (int y = x; y < height; y = y + boxSize) {
    rect(x, y, boxSize, boxSize);
  }
  // the ystart = ... line was removed and ystart changed to x above
}
```

- It would no longer form a staircase.
 - It would not change at all.
 - It would still form a staircase but the appearance would somehow change (e.g. when the columns appear, or the order in which they appear, or their shade of grey, or how big the staircase will be).
- How many points are drawn by the following program? A. 0 B. 1 C. 5 D. 25 E. 50 or more

```
for (int i = 1; i <= 50; i = i + 1) {
  if (i % 2 == 0)
    point(i, i);
}
```

THERE ARE MORE QUESTIONS ON THE BACK

5. Which static Processing sketch/program below reproduces the image to the right. It is the default 100x100 and does not change. The small square in the upper left corner is 10x10. Check ALL that apply.

```
noStroke(); // choice A
for(int i = 0; i < 10; i++) {
  rect(i,i,10,10);
}
-----
noStroke(); // choice B
for(int i = 0; i < width; i=i+10) {
  rect(i,i,10,10);
}
-----
noStroke(); // choice C
int i = 0;
while(i < width) {
  rect(i,i,10,10);
  i = i + 10;
}
-----
noStroke(); // choice D
for(int i = 0; i < 10; i++) {
  rect(i*10,i*10,10,10);
}
E. None of A-D create the image.
```



6. What does this program print? The function print() is like println() except that it does not print a new line character after printing the value so if more than one of the print() statements execute all output will be on one line. WARNING! The indenting MAY be misleading.

```
int x = 10, y = 10, z = 30;
if (x == y){
  print("A");
  if (x < z)
    print("B");
}
else print("C");
```

- A. A
B. B
C. C
D. AB
E. AC

7. What expression can you put in the blank so this program shows a circle moving from the left edge (halfway down) to the center of the display and then diagonally to the lower right corner? Check ALL that apply.

```
int ballX,ballY=50;
void draw() {
  background(120);
  ballX = ballX + 1;
  ballY = ballY + _____;
  ellipse(ballX, ballY, 20, 20);
}
```

- A. frameCount/50
B. frameCount%50
C. (1-(ballY/50))
D. (1-(frameCount/100))
E. ballX/50

8. How many rectangles are drawn by the following processing sketch?

```
// Trick question?
int i = 0;
while (i <= 0) {
  rect(i, i, 10, 10);
  i = i + 10;
}
```

- A. 0
B. 1
C. 10
D. 100
E. more than 100

9. What does the following print?

```
for (int i = 1; i <= 4; ++i) {
  print(i);
}
```

- A. 123
B. 234
C. 1234
D. 2345

10. What is displayed by this program in frame 2 and beyond?

```
int x = 0, y = x;
void draw() {
  background(255);
  while ( x < width) {
    rect(x,y,10,10);
    x = x + 10;
  }
}
```

- | | |
|---|--|
| A. An empty white display. | B. A diagonal line of 10x10 squares. |
| C. One 10x10 square in the lower right corner. | D. A row of 10x10 squares along the top edge. |