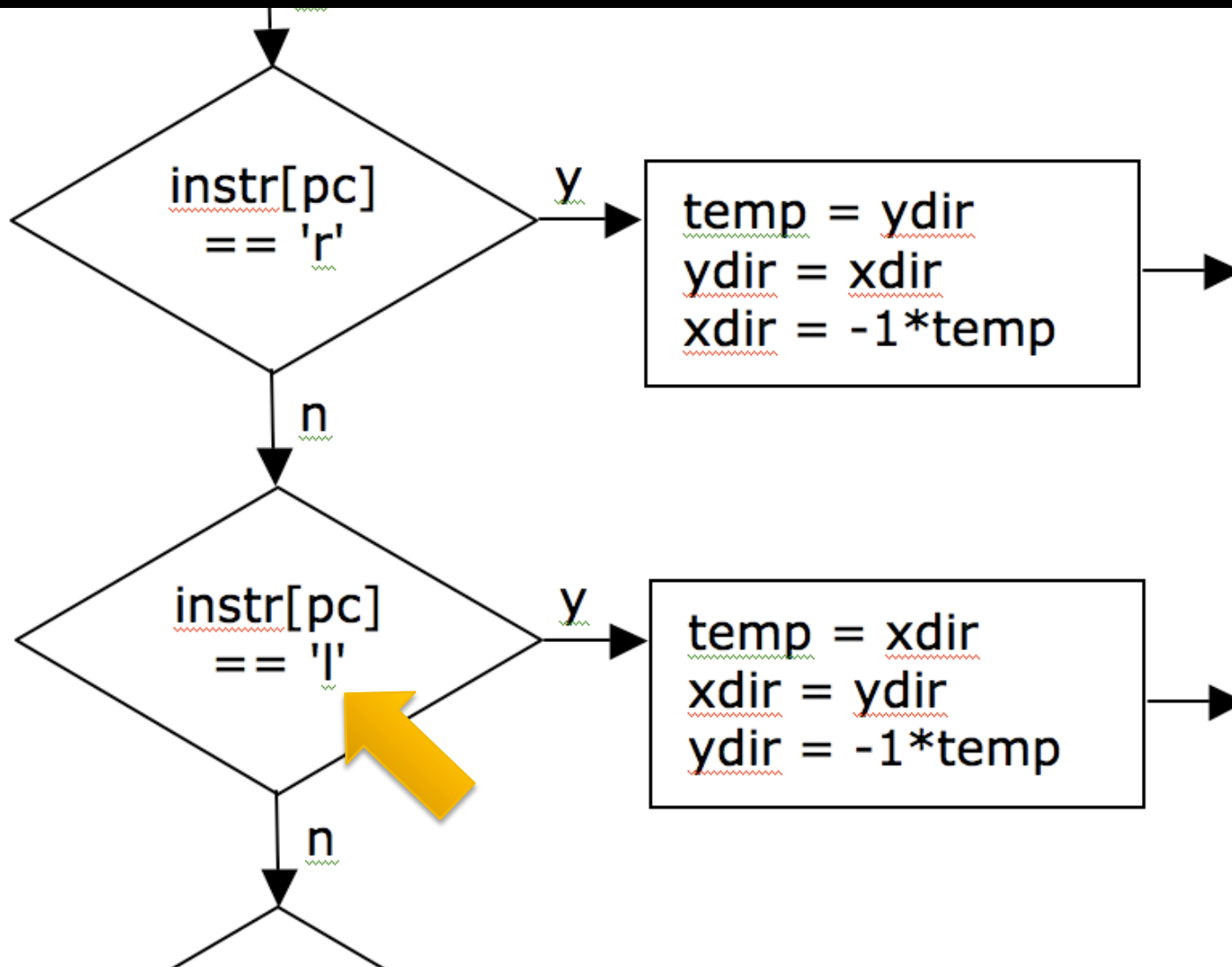# Correction

We've ripped right along, and learned a lot!

What We've Learned So Far

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Announcements

- The Midterm is Monday –
  - One sheet (8.5" x 11") of notes, handwritten OK
  - No other materials except pencil & eraser – no phone, calculator, computer, books, etc.
  - The test is on paper … this means that program text – int, for, mouseX – will not be highlighted

Topic: Representing Information

- Information is physically represented by the presence or absence of some phenomenon at a specific place or time –
  - Properties: discrete, be able to set it / detect it
    - Give examples of these properties
  - Direct use of properties: winking; dog barking;
    - Other examples … abstract all as binary
  - Numbers represented in binary
    - Count, add, covert to/from decimal, hex
  - Letters represented in ASCII, UTF-8
    - Difference between 0011 0111 and 0000 0111?

Abstraction

- Functional abstraction: find a sequence of operations that perform a "meaningful" operation: package them w/name, parameters and precise specification

  - Ex 1: Lightbot 2.0; std name, no params, 8 insts.
  - Ex 2: Symbolic Lightbot: name, no params, n insts.
  - Ex 3: Processing: name, params, n instructions

- When functionally abstracting you create a *concept* – a new idea (w/ name & meaning) to use without "worrying about the details"

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To Abstract ...

- To abstract (in CS) is to "extract the rule or pattern" from a process or situation:
  - To draw three squares in a row, we write
    - rect(x , y, s, s);
    - rect(x + s, y, s, s);
    - rect(x + 2*s, y, s, s);

    > But when we **abstract**, we see that this is really rect(x+j*s, y, s, s) for j=0,1,2

  - We saw Pacman change
    - arc(mv, 100, 80, 80, radians(50-2*(1+mv%25), ...);
- You have been learning to abstract in this sense, too

Privacy & Social Use of I'net

- Privacy – right of people to decide the extent they reveal information about themselves
  - Discussion: Revealing other people's information
  - Guidelines for public discourse on I'net: Offensen…
  - Five guidelines for posting on social network

Computation Raises Questions

- Programs that can approximate an artist's work through random numbers give a different perspective on classic questions: "What is the artists contribution to Art?"

Properties of Computation

- Composed of commands or instructions
- Presented in sequence; executed in sequence
- Commands direct an agent
- Keeping track of the "current instruction" in the sequence: yellow box in Lightbot; program counter for computers

Properties of Computation (cont.)

- The execution sequence can be interrupted to execute a function – suspend current sequence, go to function definition, initialize parameters, run – so that when complete, return is to point of suspension
- Conditional commands (If-statements) skip instructions; looping repeats instructions

Programming ... the ideas

- Give examples of these ...
  - Declarations
  - Data types
    - Also, examples of specific data types like float
  - Expressions
  - Assignment statements
  - If-statements
  - For-statements
  - Function definitions and calls
    - Also, distinction between value-returning and void

These ideas are in ALL programming languages; we give our examples using Processing

Understanding Code

- We have learned how to read code
- What do these do ...?

```
x = (x + 1)%5;
```

```
float y = 12;
```

```
if (age > 18) {
   vote = "yes";
} else {
   vote = "no";
}
```

```
for (int j = 0; j < 10; j = j + 1) {
   rect(10+20*j, 50, 10, 10);
}
```

```
ellipse(mouseX, mouseY, 20, 20);
```

```
float x=100;
float y = x%10;
if (x == 10) {
   y = y+1
}
```
What are x, y
after this code?

```
for (int j = 0; j < 10; j = j + 1) {
   w = j;
}
```
What values does w get assigned?

Computer Structure

- Computers have five main parts …
- Computers are "instruction execution engines"
- The "engine" is the fetch/execute cycle with its infinite loop of five operations
- What does instruction ADDB 30,40,50 mean?
- How often must a computer reference its memory to execute an instruction?

Game Changers ...

- Many technological advances have come since WWII, but only a few are 'game changers' ... what are examples?
- The invention of Integrated Circuits was a game changer because to properties, which were?
- http is a language computers speak to each other that enables what?

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Binary

- The number 77 can be written in binary ... what is it?
- The binary number 0010 0010 0100 is what decimal number?
- The hexadecimal number B4 1E is what in binary
- Given binary 0101, 0101 what is their sum
- UTF-8 is a standard character encoding that uses 1-4 bytes to encode characters ... why do we need it when we have ASCII?

Principles

- State the Bias-free Universal Medium Principle

  - Give three examples that illustrate this for

    0000 0000 0000 0000 1111 1111

- Functions can be built from primitive instructions or other functions … which allows problems to be solved using …?

  - Illustrate the point by describing a computation developed in class or an assignment

Summary

- I have taught a LOT of capabilities and information – and you have worked hard to learn it! Good going!!

- What questions remain?