

# Algorithms & Pseudocode

10/3/18

## 2-3 & 2-4

- Students will provide a definition of "algorithm".
- Students will identify the characteristics of describing algorithms in English, pseudocode, or a programming language.
- Students will demonstrate an understanding that there are different algorithms for different situations, such as parallel processing for multiple CPUs.

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Today



# Follow Some Algorithms...



Ching Chong



# Some Basics of algorithms

- Languages for representing algorithms:
  - Natural language (e.g., English)
  - Pseudocode
  - Programming language (Scratch, Python, Java, assembly...)
- Three main types of algorithm statements:
  - Sequencing
  - Selection → if
  - Iteration → repeat
- Algorithm design strategies:
  - Abstraction
  - Top-down design

Flowchart

# Magic Square



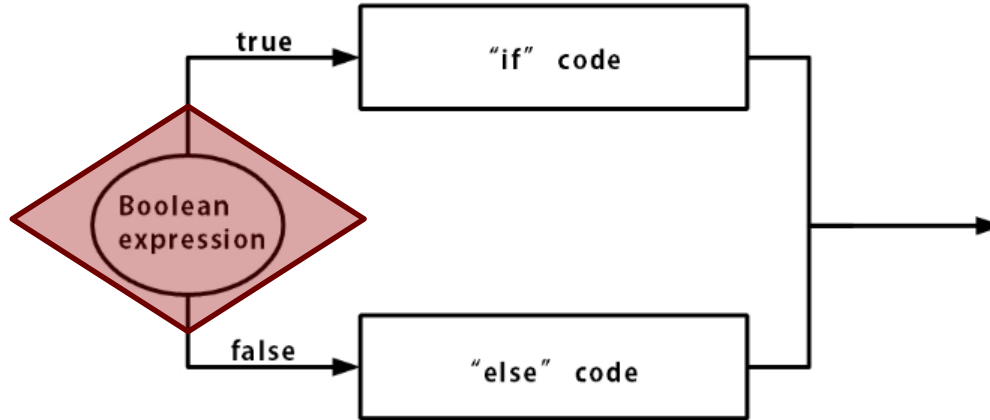
# Multiple Processors vs. Parallel Processors



# Selection Statements

- **Selection statements:** changes the normal flow of control
- **Conditional statement (if... then... else...):** asks a question and selects among alternative options
  1. Evaluate the true/false condition
  2. If the condition is true, then do the first set of operations and skip the second set
  3. If the condition is false, skip the first set of operations and do the second set
- **Example:** check to see if our rectangle is a square

# Selection Statements



If condition

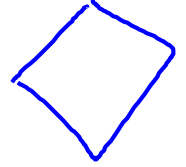
# Pseudocode for Calculating Rectangle Area and Perimeter with Algorithm to determine if a rectangle is a square.



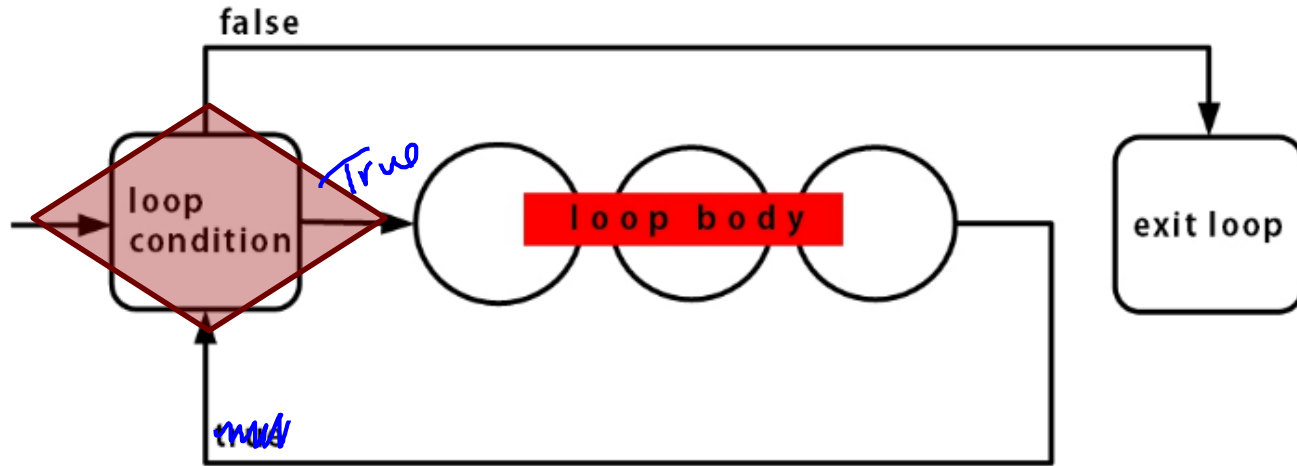
# Iteration/Repetition

- **Iteration:** an operation that causes looping, repeating a block of instructions (“body”)
- **While** statement repeats the loop body as long a condition remains true
  - **continuation condition:** a test to see if while loop should continue
  - **loop body:** instructions to perform repeatedly
- Example: repeated rectangle calculations

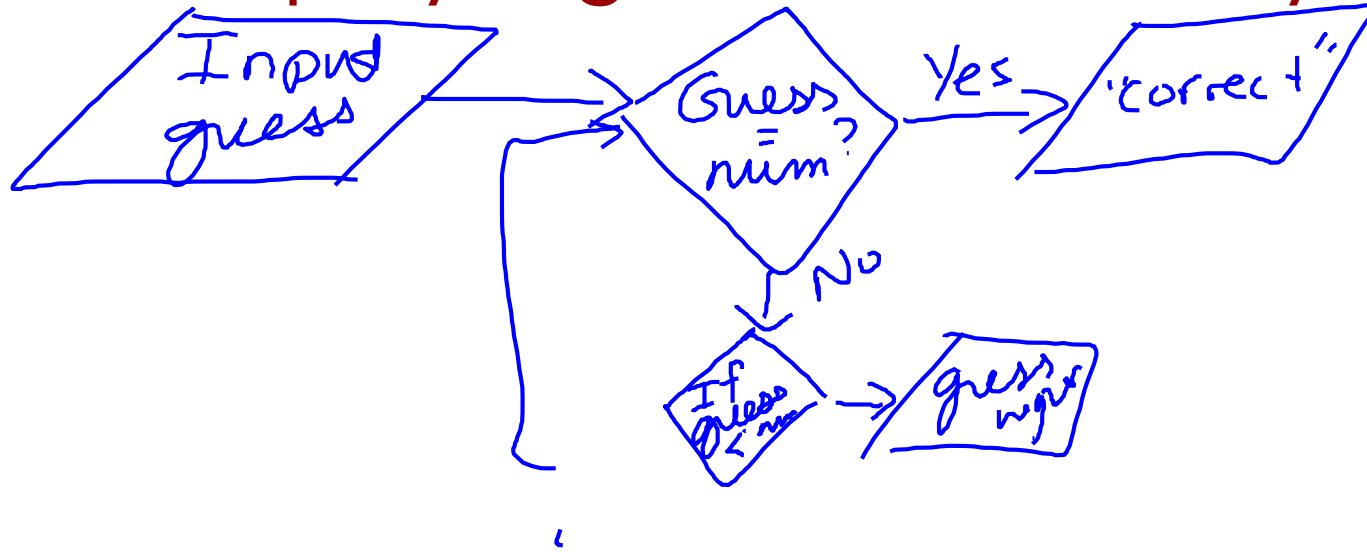
while . . . .  
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# Iteration/Repetition



Pseudocode  
for a number guessing game, guess  
until the player guesses correctly.



# Pseudocoding a Game: Matching Coins

Chris and Pat are playing a game called “Matching Coins”. Both Chris and Pat have 10 coins. Each time the game is played, Chris and Pat both flip a coin at the same time. If the coins match (both flip Heads or both flip Tails) Chris Wins. Else if the coins do not match (HT or TH) then Pat Wins. The students are playing ten times. Identify the variables that you will need to maintain and write the pseudocode that simulates Chris and Pat playing the game.

