UNIT 3C
Algorithmic thinking continues
Announcements

• PS2 is due Today Friday Feb 1 in class.
• PA3 (2/5) and PS3 (2/8) are out now
  – Topics covered
    • conditionals
    • Iterations and use of \ and %
    • ASCII art – nested loops
    • Counting and while loops
    • Tracing code
    • From algorithm to code
    • Flow charts
Return Statement

• A return statement is just like a print statement TRUE/FALSE

• What is the purpose of having a return statement in a function?________________

• Can we have more than one return statement in a function?
Return Statement ctd..

• Can we return more than once from a function?

• Can we have a return statement inside a for or while loop?
Return statement

• How does it work?
Questions??

• What is the difference between PRINT and PUT statements in Ruby?
Tools for Developing algorithms
Developing algorithms

• An algorithms must be
  – correct, efficient, tested

• Tools for developing algorithms
  – Flow Charts
Control Flow for while Loops

If the loop condition becomes false during the loop body, the loop body still runs to completion before we exit the loop and go on with the next step.
Control Flow for if Statements
Draw a flow chart

• Given a score, print a grade
Tools for Implementing algorithms
Truth Tables
AND, OR, NOT tables

• DeMorgans Law
Relational Operators

• If we want to compare two integers to determine their relationship, we can use these relational operators:
  
  <  less than  
  <=  less than or equal to  
  >  greater than  
  >=  greater than or equal to  
  ==  equal to  
  !=  not equal to
Examples

- Classify following statements as “always false” “always true” or if “sometimes true”, then provide a value(s).

<table>
<thead>
<tr>
<th>statement</th>
<th>Always false</th>
<th>Always true</th>
<th>Sometimes true</th>
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Branching
if/else statement

Format:

if bool\_condition then

\textit{statement\_list1}

else

\textit{statement\_list2}

end
Write a function to print the grade given a score
iteration
while loop

Format:

```plaintext
while bool_condition do
  loop body
end
```

one or more instructions to be repeated

If the loop condition becomes false during the loop body, the loop body still runs to completion before we exit the loop and go on with the next step.
Examples
Interest calculation (flow chart)

• The problem: Given an total amount “owed” and a monthly “rate”, find how many “payments” can be deducted from the total. Return the value
Interest calculation (code)
Write a function to check if a number is prime
Use the isPrime function to print all primes between any two numbers
Nested Loops
ASCII ART

• How would you draw a skyscraper?
• How would you combine them to create a skyline?
Next week

• Arrays
• Algorithms on Arrays
• Complexity of algorithms