CS 111
Introduction to Computer Science

Fall 2015

Request an SP number at:

http://www.cs.rutgers.edu/courses/registration.html

Lectures and Instructors

Andrew Tjang (coordinator) atjang@cs.rutgers.edu

Office: HLL407

Office Hours: TTh 3:30p-4:30p

Lecture BRR1095, TIL232

TTh 5:00p-6:20p, 8:10-9:30p

Sesh Venugopal (venugopa@cs.rutgers.edu)

Office: HLL406

Office Hours: W10:30-11:30a, 1:30p-2:30p

Lecture MI100

TTh 1:10p-2:30p

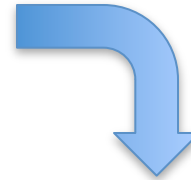Ana Paula Centeno (anapaula@cs.rutgers.edu)

Office: HLL359

Office Hours: MW12p-1p

Lecture TIL254, LOR-022

MW 1:40p-3:00p, 7:15-8:35p

Recitations

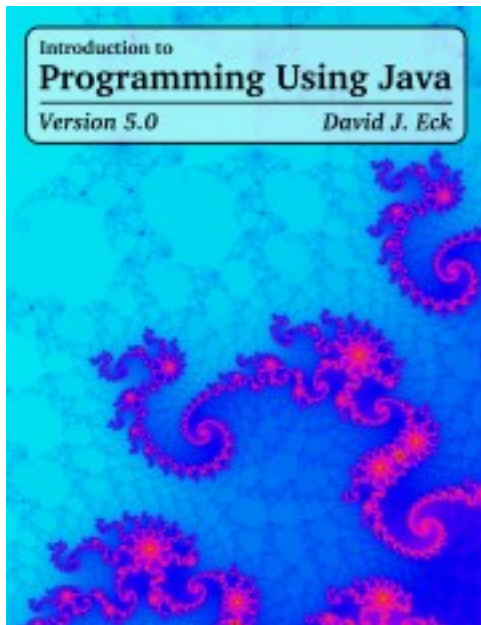**Group Problem-Solving Exercises**

Led by Undergraduate Peer Leaders

PARTICIPATION REQUIRED

Resources + Requirements

Piazza.com Online Discussion Forum
Turing's Craft Codelab

FREE ONLINE textbook

Introduction to
Programming Using Java
Version 5.0   David J. Eck

http://sakai.rutgers.edu

Sakai@Rutgers

Assignments
Grades
Announcements
Lecture Notes
Code Samples
Syllabus, Policies

What CS 111 is About

python

JAVA   C++

C

Learning to PROGRAM computers

To BUILD software

Google

Using classic
Computer Science PROBLEM SOLVING techniques

You Should NOT be in CS 111 If...

You want to know what computers are and how they are used (Take **CS 110** – Introduction to Computers and Their Application)

You want to know what Computer Science is all about (Take **CS 105** – Great Insights in Computer Science)

You want to learn specific computing techniques for Math and the Physical Sciences (Take **CS 107** – Computing for Math and the Sciences)

You want to know how to use computers in business (Take **CS 170** – Computer Application for Business)

Basic Computer Skills You Are Expected to Know

- ✓ Using Email
- ✓ Using the Web
- ✓ InstallingSoftware
- ✓ File Types (Zip, Text, Executable, etc.)
- ✓ Finding Files on the Computer
- ✓ Zipping Files
- ✓ Using Command Window/Terminal

Grading

- Homework: 10%

- Recitation: 10% (Attendance and participation)

- Codelab: 10%

- Project: 10%

- Midterm 1: 15% (Oct 12, 9:40p-11p)

- Midterm 2: 15% (Nov 16, 9:40p-11p)

- Final Exam: 30%

Intense Course! 8 – 12 Hours of Work Expected Outside of Class

Research Statement

As Rutgers is a research university there is a possibility that by enrolling in this class you may be asked to participate in a research study. Participation in any such study will be optional and at no time will participation in a research study be part of a grade or a requirement for this course. This notification does not imply that by enrolling in this class you have provided consent to be a subject in a research study. Should you be asked to participate in a research study a consent form will be presented to you describing the study and asking for your signature. Participation in research is always voluntary and refusing to participate will have no adverse effects on your standing in the course. To learn more about research at Rutgers University and Human Subject research go to

http://orsp.rutgers.edu/index.php?q=content/institutional-review-board-irb.

Extra Slides

The Programming Process

1. Problem Analysis

   - inputs, outputs, error conditions
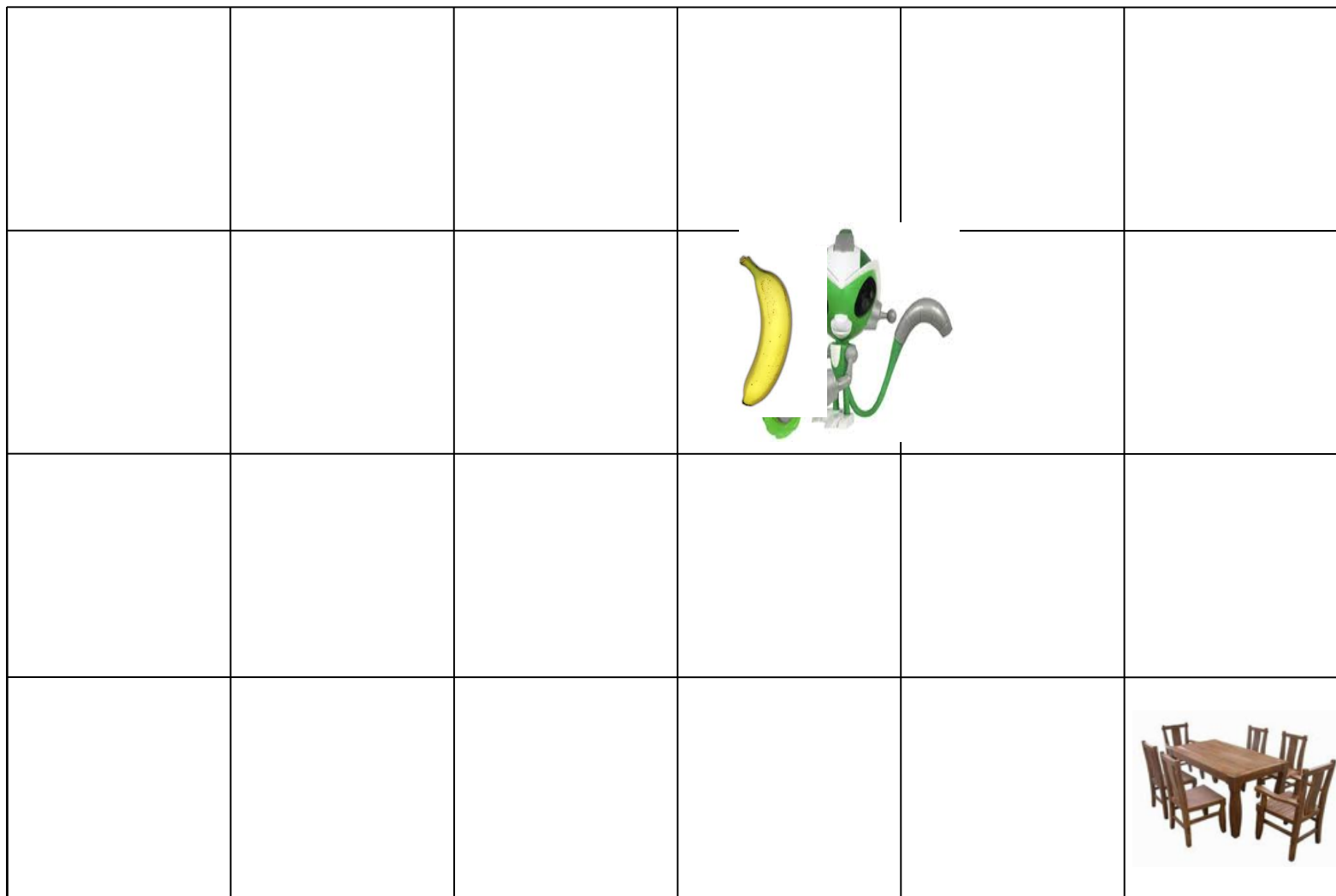
2. Program Design

3. Algorithm Construction

   - will use flowcharts

4. Coding

   - will use a programming language (Java)

5. Testing

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Example: robot control
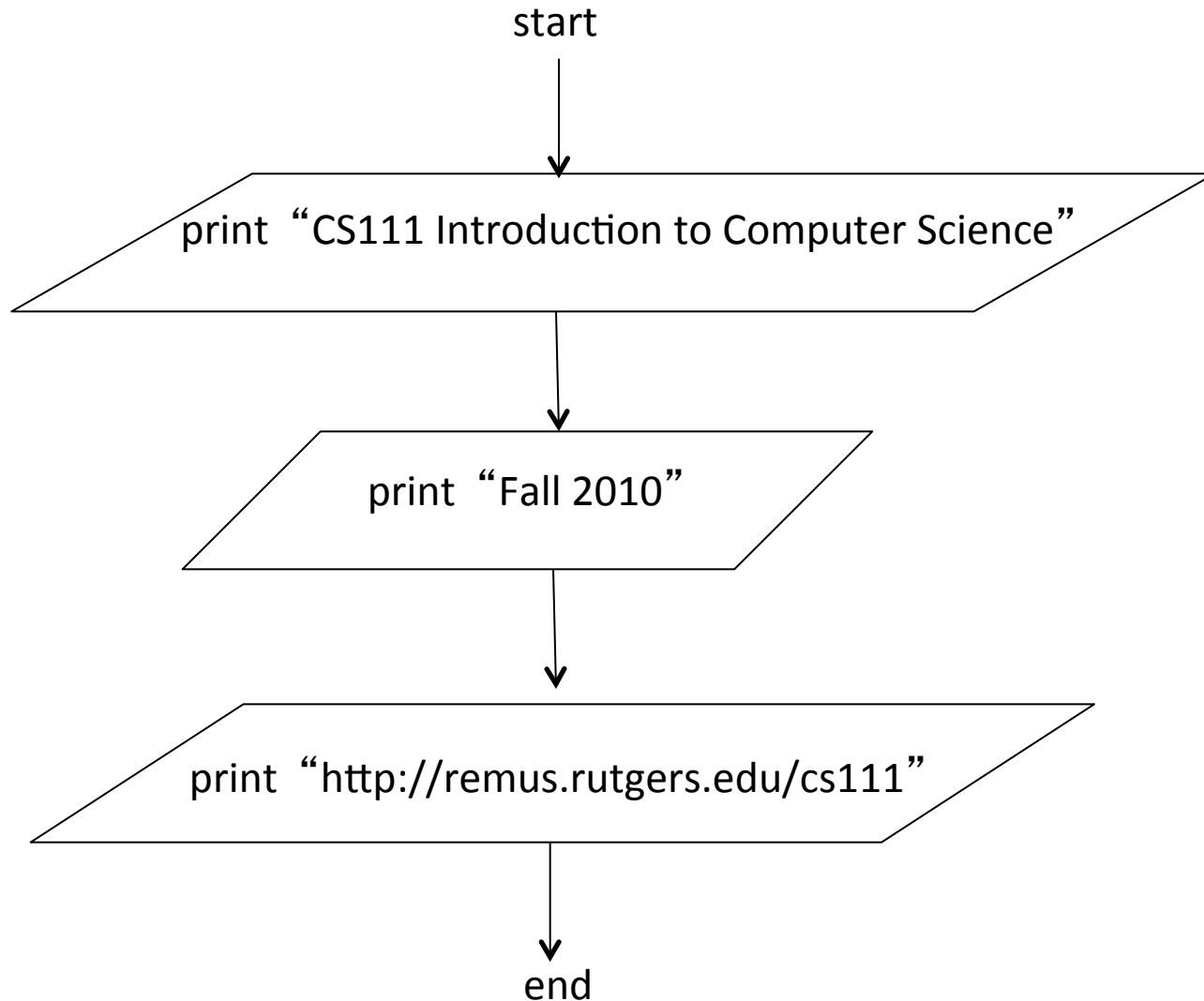
Example: robot control

Available operations

move north (distance)

move south (distance)

move east (distance)

move west (distance)

pick up (object)

put down (object)

input integers

store data

compare numbers

make decisions

print to screen

looping (iteration)

arithmetic

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DESIGNING PROGRAM LOGIC

FLOWCHARTS

Printing Data/Information (Output)

start

print "CS111 Introduction to Computer Science"

print "Fall 2010"

print "http://remus.rutgers.edu/cs111"

end

Printing (output), reading (input), computing (processing)

start

print "Enter temperature in Fahrenheit:"

read fahrenheit

celsius = fahrenheit * 9 / 5 - 32

print celsius

end
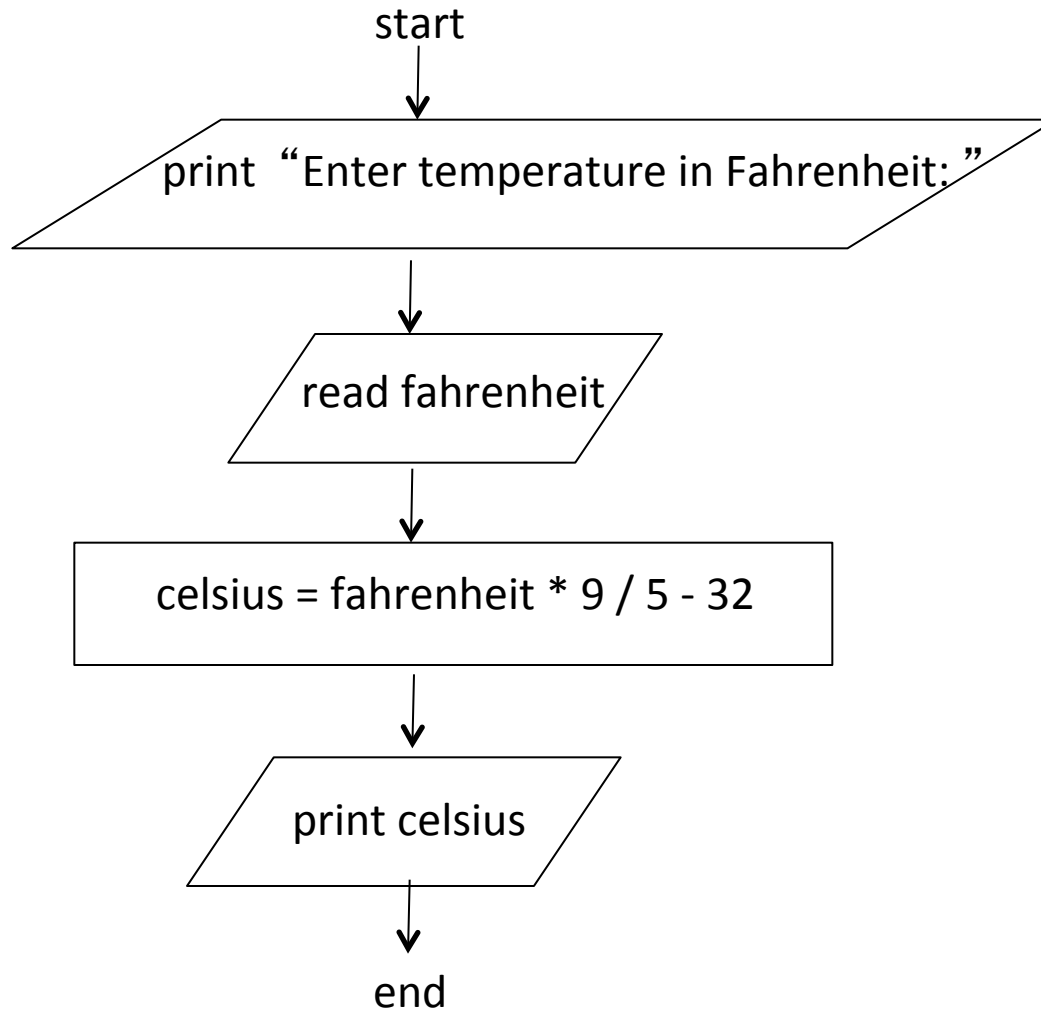
Does The Program Work Correctly?

Check by running it for various input (fahrenheit) values, and compare the output (celsius) value against the expected (correct) value. This process is called TESTING

Input (Fahrenheit)	Output (Celsius)	Expected Result
32	25.6	0
100	148	37.78
-40	-104	-40
-300	-572	-184.44

The results of testing the program show that it does NOT work correctly.

celsius = fahrenheit * 9 / 5 - 32

celsius = (fahrenheit – 32) * 5 / 9   Retest to confirm that this is correct

Are All Input (Fahrenheit) Values Acceptable?

The temperature of **-273.15** Celsius is called ABSOLUTE ZERO.
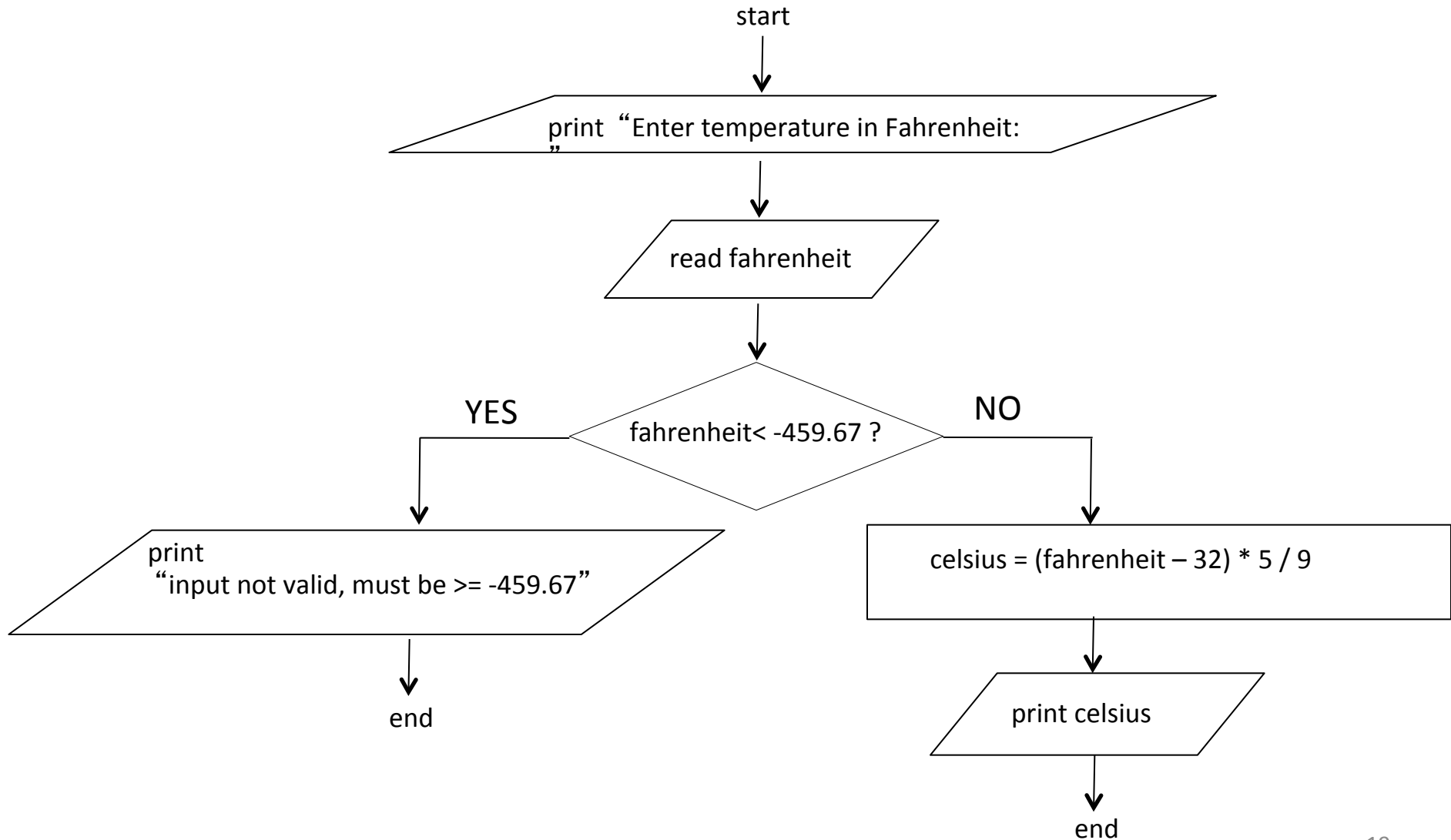
Molecular energy is minimal at absolute zero.

Absolute zero **cannot be reached** by natural or artificial means

-273.15 Celsius is equivalent to **-459.67** Fahrenheit –
any F values less than this would be below absolute zero.

Input values less than **-459.67** are NOT acceptable to our program

Rejecting Unacceptable Input – Making a Decision (Yes/No)

start

print "Enter temperature in Fahrenheit: "

read fahrenheit

fahrenheit< -459.67 ?

YES

NO

print "input not valid, must be >= -459.67"

celsius = (fahrenheit – 32) * 5 / 9

end

print celsius

end

Does The Modified Program Work Correctly?

TEST by running it for various input (fahrenheit) values, and compare the output (celsius) value against the expected (correct) value.

Input (Fahrenheit)	Output (Celsius)	Expected Result	
32	0	0	
100	37.38	37.78	
-40	-40	-40	
-300	-184.44	-184.44	
-459.67	-273.15	-273.15	ABSOLUTE ZERO
-500	Input not valid…	Input not accepted	

The results of testing the program show that it works correctly.

CORRECTLY WORKING means producing correct results for valid inputs, AND rejecting invalid inputs WITHOUT CRASHING.

Equivalent Program: Flipping the Inequality in the Input Check

start

print "Enter temperature in Fahrenheit: "

read fahrenheit

fahrenheit>= -459.67 ?

NO

YES

print "input not valid, must be >= -459.67"

celsius = (fahrenheit – 32) * 5 / 9

end

print celsius

end