

CDS 230

Modeling and Simulation I

Modules 1-4

Exercises

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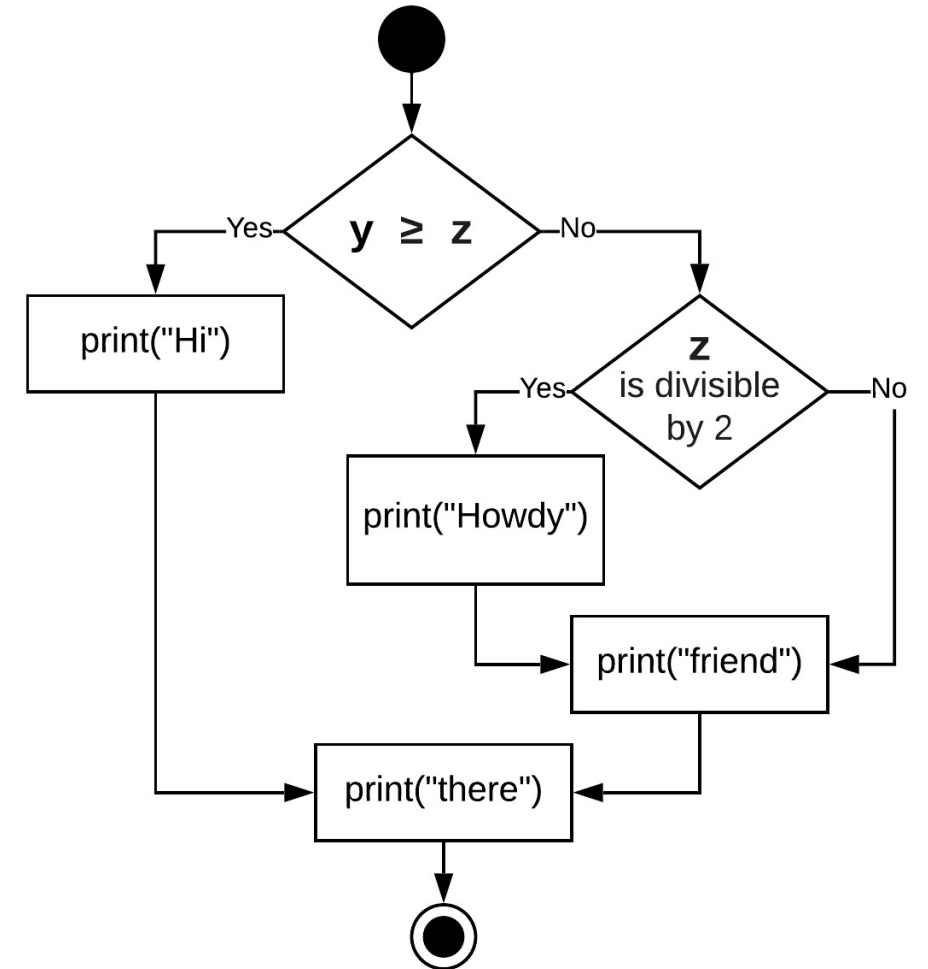


Question 1

- True or False?
 - a. Models represent something real or imaginary.
 - b. Models **cannot** be used to test theories.
 - c. Simulation means running a model over time.
 - d. Conceptual models **are** meant to be directly executed in a computer.
 - e. Python **is** a case-sensitive programming language (e.g., num and NuM are two different variables)

Question 2

- Write Python code to implement the diagram on the right and run the code with the following values.
 - $y=5, z=4$
 - $y=5, z=5$
 - $y=5, z=5.1$
 - $y=5, z=6$



Question 3

- Write the math formula, which represents the following Python code. Please do not simplify the formula in either Python or math forms. Assume that the mathematical sine function that you will write below takes input in **degrees**.

```
math.sqrt(math.exp(5)*math.pi**-1)/math.sin(math.radians(30))
```

Question 4

- You are given the variable named **test_str**. Complete the rest of the code to check if the text contains any vowels. If so, print 'Yay!'

```
test_str = input("Enter text:")  
## fill below
```

Question 5

- Eric purchased 100 meter long ribbon to use in gift packing. Write Python code which asks user “Enter the length of ribbon pieces (in cm) needed for each gift box:” and calculate how many pieces can be produced.
- E.g., user enters: 50, then, the result should be “200 boxes can be packed with ribbon pieces”

Question 6

- You are given two variables named **weight** and **height**. Assume that weight is given in kilograms and height is given in meters. **Calculate** the BMI using the formula $\frac{weight}{height^2}$ and **print** the classification according to the following table.

Body Mass Index (kg/m ²)	Classification
less than 18.4	Underweight
18.4 (inclusive) – 25 (exclusive)	Normal weight
25 (inclusive) – 30 (exclusive)	Overweight
30 (inclusive) – 35 (exclusive)	Obesity (class 1)
35 (inclusive) – 40.5 (exclusive)	Obesity (class 2)
40.5 or more	Obesity (class 3)

Table source: https://www.nhlbi.nih.gov/files/docs/guidelines/prctgd_c.pdf

Question 7

- You are given the following **gene** variable. Continue writing your code below to print how many times this text contains the sequence “AT”

```
gene="CTGTTCTTGCTACAGGCAATCAACGTTGATGTTGTGGTAGACGATTAGGAATCCCCAACGAGTTGGGACGGAGT  
TTATATATGGGTAGAGCTCCCTCGCATTCTTTCTAG"
```