An ***algorithm*** is a set of step-by-step procedure for accomplishing a task. The word "algorithm" is derived from the ninth-century Muslim mathematician, **Al-Khwarizmi** who worked on "**written processes to achieve some goal**" [Abu Ja'far Muhammad ibn Musa Al-Khwarizmi]

The term "algebra" also derives from the term "al-jabr (means "restoring", referring to the process of moving a subtracted quantity to the other side of an equation)," which he introduced.

Computer algorithms are central to computer science. They provide step-by-step methods of computations that a machine can carry out.

Programmer's job is to turn the algorithm into a program by adding details, testing procedures, and debugging or correcting errors.

We use algorithms every day. Recipes, instructions, and directions are all examples of algorithms that are not programs.

When you start your car, you follow a step-by-step procedure. The algorithm might look something like this:

1. Insert the key.
2. Make sure the transmission is in Park (or Neutral).
3. Turn the key to the start position.
4. If the engine starts within six seconds, release the key to the ignition position.
5. If the engine doesn't start in six seconds, release the key and gas pedal, wait ten seconds, and repeat Steps 3 through 5, but not more than five times.
6. If the car doesn't start, call the garage.

Algorithms

An Algorithm is a series of steps required to solve a problem.

Example of your everyday life simple task algorithm; an algorithm for baking a cake might be:

Step1: Heat oven to 180 degrees Centigrade
Step2: Gather the ingredients
Step3: Mix the ingredients in a bowl
Step4: Pour the ingredients into a cake tin
Step5: Bake in the oven 20 minutes
Step6: Repeat
Step7: Bake in oven 5 minutes
Step8: Until cake cooked
Step9: Take cake out of oven and place on cake rack

We use algorithms in this way to help design the steps of a computer program.

Check your algorithm against the four criteria:
(http://www.cs.sfu.ca/CourseCentral/120/ggbaker/guide/parts/guide01**)**

a. Un-ambiguous: When you read an algorithm, there should be no question about what should be done. If you understand cooking terms like "Gather the ingredients", and "Baking a cake", then you can probably follow most of this recipe.
b. Solves a problem: an algorithm should always present a solution to a particular problem. In our case, the problem must have been something like "Using these ingredients, make a cake."
c. Legitimate input: In this example, "legitimate" ingredients include sugar, eggs, flour and butter.
d. Finite amount of time: once we start the algorithm, eventually it will finish at step 9

Pseudocode

Pseudo-code is an outline of a program written in a way that it can be easily converted into a computer programming language.

Questions

The algorithms below have been written using pseudo-code. Can you say what each does?

Program 1

1. set yes_votes to 79
2. set no_votes to to 17
3. total_votes = yes_votes + no_votes
4. display total_votes

Program 2

1. ask user for juice_cost_price
2. ask user for juice_sale_price
3. ask user for cans_sold
4. unit_profit = juice_sale_price - juice_cost_price

5. total_profit = unit_profit x cans_sold
6. display total_profit

Program 3

1. ask user for traffic light color
2. if color is red then
3. display "STOP"
4. else if color is yellow then
5. display "WAIT"
6. else
7. display "PASS"

Program 4

1. repeat 12 times
2. display "Happy Computing!"
3. end repeat

Variables

Variables are reserved memory locations to store values; when you create a variable you reserve some space in memory.

Based on the data type of a variable, the interpreter allocates memory and decides what can be stored in the reserved memory. Therefore, by assigning different data types to variables, you can store integers, decimals or characters in these variables

Python has some conventions for variable names. You can use any letter, the special characters "_" and every digit (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) provided you do not start with it.

Python variable names are case-sensitive, so counter and Counter are not the same variable.

The following list of words cannot be used as variable names. These are some reserved words (keywords) for Python. These keywords define the language rules and have special meanings in Python. Here is the list of all of them:

And, assert, break, class, continue, def, del, elif, else, except, exec, finally, for, from, global, if, import, in, is, lambda, not, or, pass, print, raise, return, try, while, yield

Python Function Template

```
# Defining Functions

# def starts a function definition
# names of functions follow variable naming conventions

#A docstring is a string literal that occurs as the first statement in a function, module, class, or method definition.

def greeting():

    """ A function for greeting people""" #docstring

    print "Hello,  World!"
    print "From CPSC-111v Class"
    print "At Alexander College in Vancouver, Canada"

greeting()
```

Question

The letter A has a code of 65.

What does this message say?

01000010 01001100 01000001 01000011 01001011 00100000 01000011 01000001 01010100