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Homework 2

CS/ECE 252 Section-2 (MWF 11:00)

Assigned on September 12th
Due on September 23rd by the beginning of class (11 AM)
Submit questions 1-9 by hard copy. Typing is preferred over hand writing.
Submit questions 10-12 through the browser based infrastructure at
https://discovering.cs.wisc.edu/homework/homework.html

1. What acts as an intermediary between a high-level programming language and the ISA? **(1)**

2. In the classic parable mentioned in section 2.1, what exactly caused the trouble? How do computer programming languages and algorithms avoid such a situation? **(2)**

3. Define efficiency and scalability. How are they related? **(2)**

4. Step through this example program and print x and y at each step **(2)**

```
x = 5
y = x + 4
x = 3
x = 5*x + 2*(3 - y)
```

5. Generally, once one line's instruction is completed, the next instruction to be run is the one on the following line. What type of instructions are an exception to this general rule? **(1)**

6. What role does the backslash character (\) play in Python syntax? Give an example line of code where it will be useful. **(2)**

7. What is an operation permitted on strings in Python? Give an example of its usage. **(2)**

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8. How many times will the “hello” be printed by each of the following sequence of statements? What is the value of i at the end in each case?

a. **(1)**

```
i = 0
while(i < 10):
      print("hello")
      i=i+1
```

b. **(1)**

```
i = 3
while(i <= 10):
      print("hello")
      i=i+1
```

c. **(2)**

```
i = 0
while(i < 2):
      j = 0
      while(j < 3):
            print("hello")
            j=j+1
      i=i+1
```

9. Assuming there is no code before these lines, which lines of Python code would produce errors? If it will produce an error, explain. **(2)**

a. x = word
b. x = "word" + 2
c. x = "word" + "word"
d. x = "word" / "word"

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10. Write a program to swap (exchange) the values of two variables *a* and *b*. You may create additional variables if needed. Use the browser-based simulator to write and submit. **(2)**

11. Write a program to print the first n Fibonacci numbers. (Initialize n as 15). Start with 0 and 1 as the first two numbers. The next number is created by adding the previous two numbers. Thus, the series would go like this: 0 1 1 2 3 5 8 …. Use the browser-based simulator to write and submit. **(3)**

12. Say you wanted to print out the Celsius equivalent for all integer Fahrenheit temperatures from -50 degrees F to 50 degrees F. Write a program to print out this conversion information. The pseudocode for implementing this is given below.

The equation for converting Fahrenheit (F) to Celsius (C) is: $(F - 32) * \frac{5}{9}$

i. Set F's initial value to -50 (lower bound)
ii. While F is less than or equal to 50 (upper bound)
iii. Convert Fahrenheit to Celsius.
iv. If Fahrenheit and Celsius are equal
v. print "Fahrenheit and Celsius are equal at -40 degrees!"
vi. Else
vii. print the number of degrees in Fahrenheit followed by the number of degrees in Celsius. This should be printed on four lines with "Fahrenheit:" on the first line, the Fahrenheit value on the second line, "Celsius:" on the third line, and your Celsius value on the fourth line.
viii. Increment F

Use the browser-based simulator to write and submit. **(3)**

Sample output: (do not be concerned with rounding or the number of significant figures)

```
Fahrenheit:
-50
Celsius:
-45.5556
Fahrenheit:
-49
Celsius:
-45
Fahrenheit:
-48
Celsius:
-44.4444
...
```