

MATH CSI 31 - Programming I. Midterm Exam.

Professor Luis Fernández. Time allowed: two hours.

NAME: _____

PART 1:

Write the answer to the following exercises. You may not use the computer in this part, but you can look at the book. Justify your answer briefly when indicated.

[10] 1. Answer if the following statements are true or false, briefly justifying your answer.

- a) A variable in Python is a sequence of statements.

 - b) `range(7)` generates the sequence `[1,2,3,4,5,6,7]`.

 - c) In Python, `"1" + "2"` is `"12"`.

 - d) Python lists are mutable, but strings are not.

 - e) In the computer world, CPU means "Computer Programmers Union".
-

[10] 2. Answer the following multiple choice questions.

- An algorithm is like a
 - a) phone-number
 - b) variable
 - c) recipe
 - d) bag

- The items listed in the parentheses of a function definition are called
 - a) parameters
 - b) scripts
 - c) parentheticals
 - d) comments

- Which of the following *cannot* be used to convert a string of digits into a number?
 - a) `eval`
 - b) `int`
 - c) `str`
 - d) `float`

- What expression would create a circle of radius 20 pixels at point (100,200)?
 - a) `Circle(100,200,20)`
 - b) `Circle((100,200),20)`
 - c) `Point(20, Circle(100,200))`
 - d) `Circle(Point(100,200),20)`

- What function gives the Unicode (that is, extended ASCII) value of a character?
 - a) `chr`
 - b) `int`
 - c) `ord`
 - d) `eval`

[10] **3.** What is the output of this program?

```
x = 0
for i in range(5):
    x = x + i*i
    print(i)

print(x)
```

PART 2:

Write the programs below using the following guidelines.

- Name each programs “ex#.lastname”. Then upload them into the folder MidtermExam that you got by email, or at this link: <https://www.dropbox.com/request/dwuehMXcDnzaNoDmVXCW>
- Test your programs and make sure they work properly. Also, write comments!
- Extra credit will be given for nicely formatted output as well as using `try - except` to check for correct inputs in the cases when input is required.

[15] **1.** The sequence x_n is defined, for $n > 2$, by the recursive formula

$$x_1 = 1, \quad x_2 = 1 \quad x_{n+1} = 2 * x_n + x_{n-1}$$

(that is, like the Fibonacci sequence from the homework, but to get the next number one adds twice the current number plus the previous one.)

Write a program that first invites the user to input a natural number n . Then compute the n th number in the sequence x_n and display it appropriately to the user.

[15] **2.** You will need to use the module `graphics.py` for this program. Write a program that constructs a window, invites the user to present 5 clicks for the vertices of a polygon and draws a red polygon. Finally, prompt the user to click to close the window.

[15] **3.** Write a program that calculates the average word length in a sentence entered by the user.

[15] **4.** A person is eligible to be a US senator if they are at least 30 years old and have been a US citizen for at least 9 years. To be a US representative these numbers are 25 and 7, respectively. Write a program that accepts a persons age and years of citizenship as input and outputs their eligibility for the Senate and House.

[15] **5.** Write a program that prompts the user for a number n and returns the sum of the reciprocals of the first n natural numbers.

[10] **6.** [BONUS ONLY if you are done with the previous ones] Enhance the polygon exercise to receive an unlimited number of vertices until the user signals the end (with the keyboard, or clicking somewhere).