

BUAI 492

Individual Homework #1

INSTRUCTIONS: For all programs, you are expected to use good programming style (including good variable names and some comments). Before class on the due date listed in the syllabus, upload to *Canvas ONE* Jupyter Notebook file with your solutions to the following exercises. The solution to each exercise should be stored, in order, in a separate cell whose first line is a comment with the exercise number (for example, #EXERCISE 1) and followed by your solution). For any exercise whose solution is not a computer program, write your answer as a comment. **Use only statements that you have learned in the lectures. Failing to follow these instructions will result in a loss of points. DO NOT COPY SOMEONE ELSE'S ANSWERS!**

Exercise 1. What, if anything, is wrong with each of the following variable names? (5 points)

- a. True_False
- b. 3rdperson
- c. str
- d. R2.D2
- e. my list

Exercise 2. Answer the subsequent questions about the following Python statements *recalling that integers are immutable*: (5 points)

```
First = 8; x = id(First); Second = First; print(Second);
```

```
First = 9; print(Second); y = id(First);
```

- a. What values do the two print statements produce?
- b. Are the values of x and y the same?

Exercise 3. Repeat Exercise 2 *assuming that integers are mutable*. (5 points)

Exercise 4. What do each of the following print statements produce? (5 points)

```
A, B = 1, 1; print(type(A)); C = float(A); print(id(A) == id(B));
```

```
print(id(C) == id(B)); C = '1.1'; print(type(C))
```

Exercise 5. Write a program that gets the value for the integer variable *seat* from the user. Then *use only one assignment statement and NO OTHER STATEMENTS* to compute and display the value of the integer variable *group* according to the following rule (in which you can assume that the value entered by the user never exceeds 52): (10 points)

- 1, if $1 \leq seat \leq 13$
- 2, if $14 \leq seat \leq 26$
- 3, if $27 \leq seat \leq 39$
- 4, if $40 \leq seat \leq 52$

Exercise 6. Write a program that gets the number of minutes an event has been going on from the user. *Without using an if-statement*, convert those minutes into hours and minutes and display the results. For example, if an event has been going on for 315 minutes, then you should convert this to 5 hours and 15 minutes. (10 points)

Exercise 7. Ms. Smith is in a 30-percent tax bracket, which means that 30 cents of each dollar she earns is paid in taxes. She has some money that she can invest in either (a) a money market fund that pays 4% annual interest on the first \$1000 and 5% on any amount over \$1000 or (b) a government bond that pays 3% annual interest but is exempt from taxes. Write a program that obtains the amount of money to invest and determines which of these two investments is better, after taxes. Indicate how much the better investment will earn after taxes at the end of one year, *with two digits after the decimal point*. (Hint: Find out how to do this on the web.) (10 points)

Exercise 8. Suppose you are going to write a program that involves working with different dates in a year. Answer the following questions. (10 points)

- Identify two data structures you learned in class that you might use to represent a date. For each one, show how you would store March 15, 2019 in the variable *MyDate*.
- When would you use each of the data structures from part (a)?
- List at least three operations (unary or binary) that you might want to perform on dates. (You do NOT need to write these operations in Python.)

Exercise 9. Suppose you are going to write a program that involves working with different polynomials, each of which has integer coefficients (for example, $x^3 - 2x + 4$). Answer the following questions. (15 points)

- Identify a data structure you learned in class to represent a polynomial and illustrate how you would store the polynomial $x^3 - 2x + 4$.
- List at least two operations (unary or binary) that you might want to perform on polynomials besides $+$, $-$, and $*$. (You do NOT need to write these operations in Python.)
- Use your data structure in part (a) to write a program to determine if two polynomials are the same. (Hint: Use a built-in method for your data structure to do this.)

Exercise 10. Consider an inventory problem, in which a company stores the following information on each item: the SKU number (for example, K13145), price, delivery lead time (in days), quality (low, medium, high), and number of units in inventory for one item. If you were to store this in a tuple, what type of value would each element of such a tuple be? (5 points)

Exercise 11. What are the range of ASCII integers associated with the characters '0'. '1'. ... '9'? What are the range of characters associated with the ASCII integers 65, 66, ..., 90? (5 points)

Exercise 12. A deck of playing cards consists of 52 cards arranged in four suits (clubs, diamonds, hearts, and spades) each having 13 face values (1 = ace, 2, 3, ..., 10, 11 = jack, 12 = queen, 13 = king). For the computer, the suits are represented by the strings 'C', 'D', 'H', 'S', respectively, and the face values are represented by the integers 1, 2, ..., 13, respectively. Write a program that creates a set of valid suits, then asks the user to enter a card in the format of a face value followed by a suit with no separating space (for example, 6S) and determines if the values entered constitute a valid card or not. (10 points)