**ENGR 102 – Fall 2023**
**Exam 1 Practice Problems**

The following problems are for practice when studying for Exam 1. It is recommended that you attempt them using pencil and paper or typing into a document (NOT an IDE) like you would for a Canvas quiz. After attempting a problem, check your solution by typing it into your favorite IDE and debug.

Partial credit will be available for code writing problems so please comment your code. It is recommended that you write out your algorithm in comments first, then go back and fill it in with code (see the "pyramid" method in Lecture 5). Several problems (multiple choice, true/false, fill in the blank, etc) will be autograded and no partial credit will be available.

During the exam calculators are not allowed, you won't need one anyway. In addition, you may NOT use your phone, the web to search for additional information, your book, your notes, lectures on Canvas, or any form of electronic media.

**Autograded style problems:**

*Go back and review your quizzes on Canvas for additional autograded style problems including fill in the blank, multiple choice, multiple answer, and true/false type questions.*

For the following problems, write the output of the code. Don't forget `[]` `{}` and/or `,` as needed.

1. 
```
a = 5
b = 'b'
c = True
print("The answer is...", end=' ')
if a != 10:
    print("A", end=' ')
elif b == 'b':
    print("B", end=' ')
else:
    print("C", end=' ')
z = c and bool(a)
print(z, end=' ')
d = a ** 3 + 25 % 3 - 12 // 5
print(d)
```

2. 
```
n = 1
p = "A"
while n < 10:
    p += p
    n += 3
print(n, p)
```

3. 
```
a = True
b = bool('False')
c = 5 > 8
d = a and b and c
e = not a or not (b and c)
print(d, e)
```

4. 
```
mystrs = ['Good Bull', 'Whoop', 'Hullabaloo', 'Howdy', "Gig 'em", 'Aggies']
mynums = [3, 5, 4, 1, 2]
for num in mynums:
    print(mystrs[num], end=' ')
```

5. 
```
mydict = {'Ann' : 18, 'Bob' : 20, 'Charlie' : 19}
if 'Joe' in mydict:
    print("Joe is here")
elif 'Ann' in mydict:
    print("Hi Ann")
else:
    print("Anyone?")
```

6. 
```
mystr = 'The quick brown fox jumped over the lazy dog'
print(mystr[:3], end=' ')
if mystr[4] == 'q':
    if 'fox' in mystr:
        print('fox', end=' ')
    else:
        print('dog', end=' ')
    if mystr[-5] != 'z':
        print('jumped', end=' ')
    else:
        print('hopped', end=' ')
elif 'x' in mystr:
    if 'white' in mystr:
        print('white mouse', end=' ')
    else:
        print('brown cow', end=' ')
    if 'y' not in mystr:
        print('sat', end=' ')
    else:
        print('dropped', end=' ')
else:
    print(mystr[4:26], end=' ')
print('down')
```

7. 
```
mylist = []
for i in range(5):
    mylist.append(i ** 2)
print(mylist[-3:])
```

8. 
```
mystr = "Howdy! Welcome to Texas A&M Engineering!"
print(mystr[:5] + mystr[6] + mystr[-22:-1] + ' students!')
```

**Code writing problems:**

1. Write a Python program to take as input 5 birthdays from 5 users (1 each) and output them in chronological order. Dates should be entered with the month and day (not year) in the format "`June 6`" as a single input per user. You may format the output however you like (including using numbers for the month instead of words). This is a good problem to practice using dictionaries or lists of lists.

   Example output:
   ```
   User 1 please enter a birthday: December 12
   User 2 please enter a birthday: January 15
   User 3 please enter a birthday: April 12
   User 4 please enter a birthday: November 25
   User 5 please enter a birthday: April 1
   ---------------------------------------------
   January 15
   April 1
   April 12
   November 25
   December 12
   ```

2. Write a Python program to play a simplified version of the game hangman. Have User 1 input a secret word with a minimum length of 6. Then, take as input from User 2 one letter at a time until they guess a letter that is not in the secret word. At the end of the program, print out the number of guesses and the secret word.

   Example output:
   ```
   Enter the secret word: programming
   Guess a letter: n
   Guess another letter: a
   Guess another letter: e
   The secret word is: "programming". You took 3 guesses!
   ```

3. Write a Python program to take as input from the user a student's UIN. If the UIN exists as an element in the list of lists named `roster`, have your program output the first and last name of the student, their major, and their GPA. Assume `roster` is already provided and an example of its data is shown below.
   ```
   roster = [[123004567], ['Joe', 'Aggie', 'ENGE', 3.50]]
   ```

   Example output:
   ```
   Enter a UIN: 123004567
   Joe Aggie: ENGE, 3.50
   ```

4. Write a Python program to generate the following output exactly as shown using a single loop.

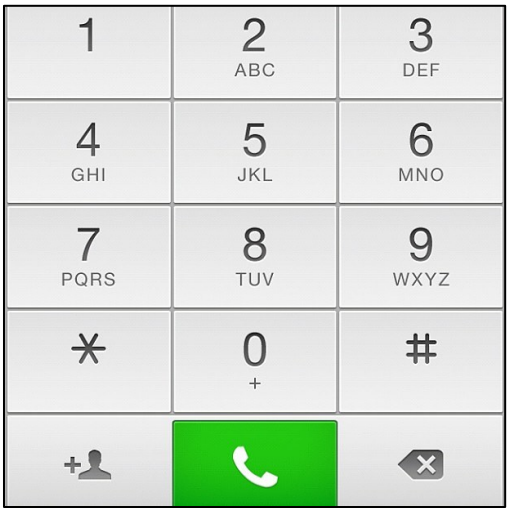
   ```
   a
   bb
   ccc
   dddd
   eeeee
   ```

5. Write a Python program that will repeatedly ask a user to input a person's age. The program should continue to ask for input until a negative number is entered, indicating that the user is done inputting data. The program should determine the total number of people and the minimum and maximum ages entered. The results should be printed to the screen using the format shown below. Include the header and align the columns.

   Example output:

```
Enter an age: 17
Enter another age: 24
...
Enter another age: -1
Number of people  Minimum age  Maximum age
32                17           24
```

6. A schematic for converting phone letters to digits mapping is shown in the image below. Write a Python program that prompts the user to enter a 10-character phone number in this format XXX-XXXXXXX. Your program should replace the last seven alphabetic characters by their equivalent digits and display the entered phone number in this format XXX-XXX-XXXX. For example, if the user enters `800-GOFEDEX`, your program output would convert the number to `800-463-3339`. You may assume that the last seven characters are alphabetic characters from A to Z.




   Example output:

```
Enter a phone number in this format XXX-XXXXXXX: 800-GOFEDEX
800-GOFEDEX is equivalent to 800-463-3339
```

**Short answer problems for studying:**

1. How do you format your output to display a number with exactly 3 decimal places?

2. What are the different assignment operators? Provide an example for each.

3. List all of the data types we have used in this class so far and provide an example for each. How do you convert between datatypes?

4. Briefly explain when it is a good idea to use an `if-elif-else` statement instead of multiple `if` statements. When is it a good idea to nest `if` statements?

5. Name 3 good reasons for including comments when programming.

6. Briefly explain why it is bad practice to use the "arch" method of program development.

7. Briefly explain when it is best to use a `for` loop vs a `while` loop.

8. What are the differences between lists and dictionaries?

9. What are the similarities between strings and lists?

10. Given the string below, write one line of code to convert it into a list of its words.
```
mystr = 'Aggie Engineers Rock And Are In High Demand By Industry'
```