CIS 125 Principles of Programming Logic
Exam #2: Decision Statements
100 points

ANSWER KEY
* There are many solutions to the programs. Several are shown here.

Directions

Complete the following three Python programs.   Program #1 is worth 60 pts. Program #2 is worth 25 pts. Program #3 is worth 15 pts.

Submit (upload) the .py for each into Moodle under Exam #2. They must be worked on individually and are due by the end of class. Late submissions cannot be accepted.   Partial credit may be provided. The exam is open book, open note, open Internet. However, you cannot receive live assistance from anyone or post questions on a discussion forums, i.e. any resources you must already exist.

Academic Honestly Policy

Students are expected to uphold the school's standard of conduct relating to academic honesty. It is imperative that standards of academic integrity be upheld for the best interest of the student, college, community, and industry. Therefore, any instances of academic dishonesty/cheating (receiving or giving assistance to classmates or any live person) will result in an immediate submission of a failing course grade to the college records system. Violations resulting in a failing grade for the course will be forwarded to the Office of the Registrar.

Program #1: Electoral Votes by State with one User-Defined Function (60 pts)

- Create a program named **exam2-1.py** that allows a user to enter a state abbreviation (as a **string**) in the **main** part of the program.
- Pass this value (state abbreviation) into a **user-defined function** which will output the number of electoral votes that state has.
- Use a single Python **IF-ELSEIF in the user-defined function**.
- The **process and output** will occur in the user-defined function, i.e. no data needs to be passed back the main. Only code the 6 states below.

State	Abbreviation	Output/Message
Georgia	GA	Georgia has 16 electoral votes.
Kentucky	KY	Kentucky has 8 electoral votes.
California	CA	California has 55 electoral votes.
Florida	FL	Texas has 29 electoral votes.
Arkansas	AR	Arkansas has 6 electoral votes.
New Jersey	NJ	New Jersey has 14 electoral votes.

Program #1: Code Organization Diagram (one function: data in/no data out)

| User-Defined Function | Process and Output |
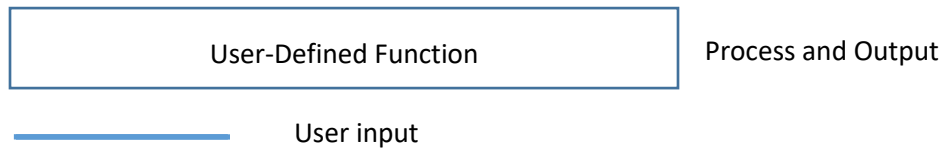
——————— User input

Sample run #1:   (Note: GA is user input from the keyboard)

Please enter your state abbreviation: GA
Georgia has 16 electoral votes.

Sample run #2:   (Note: AR is user input from the keyboard)

Please enter your state abbreviation: AR
Arkansas has 6 electoral votes.

```python
def electoralVotes(state):
    if state == "GA":
        print("Georgia has 16 electoral votes.")
    elif state == "KY":
        print("Kentucky has 8 electoral votes.")
    elif state == "CA":
        print("California has 55 electoral votes.")
    elif state == "FL":
        print("Florida has 29 electoral votes.")
    elif state == "AR":
        print("Arkansas has 6 electoral votes.")
    elif state == "NJ":
        print("New Jersey has 14 electoral votes.")

state = input("Please enter your state abbreviation: ")
electoralVotes(state)
```

Option 2:

```python
def electoralChecker(state):
    if state.lower() == "ga":
        print("Georgia has 16 electoral votes")
    elif state.lower() == "ky":
        print("Kentucky has 8 electoral votes")
    elif state.lower() == "ca":
        print("California has 55 electoral votes")
    elif state.lower() == "fl":
        print("Florida has 29 electoral votes")
    elif state.lower() == "ar":
        print("Arkansas has 6 electoral votes")
    elif state.lower() == "nj":
        print("New Jersey has 14 electoral votes")

state = input("Enter your state abbreviation: ")
electoralChecker(state)
```

Program #2: Structure of the Earth (15 pts)

Create a Python program named **exam2-2.py** that allows the user to input a depth inside the earth in kilometers (integer). The program will then inform the user what layer of the earth's structure this is. Use an IF-ELSEIF-ELSE. **You do not have to use a user-defined functions**.

The layers (structure) of the earth's interior and their approximate depth is:

- Crust: 0 to 35 kilometers
- Upper Mantle: 36 to 660 kilometers
- Lower Mantle: 661 to 2890 kilometers
- Core: 2891 to 6360 kilometers

Source: https://en.wikipedia.org/wiki/Structure_of_the_Earth

Sample run #1:   (Note: 33 is user input from the keyboard)

        Please enter depth in Earth: 33
        You are in the Earth's crust.

Sample run #2:   (Note: 2999 is user input from the keyboard)

        Please enter depth in Earth: 2999
        You are in the Earth's core.

Option 1:

```python
depth = int(input("Please enter a depth in Earth: "))
if depth >= 0 and depth <= 35:
    print("You are in the Earth's crust")
elif depth > 36 and depth <= 600:
    print("You are in the Earth's upper mantle")
elif depth > 661 and depth <= 2890:
    print("You are in the Earth's lower mantle")
elif depth > 2891 and depth <= 6360:
    print("You are in the Earth's core")
else:
    print("This is an invalid depth")
```

Option 2:

```python
depth = int(input("Please enter depth in Earth in KM: "))
if 0 <= depth <= 35:
    print("You are in the Earth's Crust.")
elif 35 < depth <= 660:
    print("You are in the Earth's Upper Mantle.")
elif 660 < depth <= 2890:
    print("You are in the Earth's Lower Mantle.")
elif 2890 < depth <= 6360:
    print("You are in the Earth's Core.")
else:
    print("Invalid input. Earth's max depth is 6360.")
```

Option 3:

```python
depth = int(input("Please enter a depth in Earth: "))
if depth <= 35:
    print("You are in the Earth's crust ")
elif depth <= 600:
    print("You are in the Earth's upper mantle ")
elif depth <= 2890:
    print("You are in the Earth's lower mantle ")
elif depth <= 6360:
    print("You are in the Earth's core ")
else:
    print("This is an invalid depth")
```

Option 4:

```python
depth = int(input("Please enter a depth in Earth: "))
if depth > 6360:
    print("This is an invalid depth")
elif depth > 2891:
    print("You are in the Earth's core")
elif depth >= 661:
    print("You are in the Earth's upper mantle")
elif depth >= 36:
    print("You are in the Thermosphere")
elif depth >= 0:
    print("You are in the Mesosphere")
else:
    print("This is an invalid depth ")
```

Program #3: Numbers: Even, Odd, Positive, Negative (10 pts)

Create a Python program named **exam2-3.py** that does the following:

- Asks (promotes) the user for user-input of an **integer** number
- Determines and outputs if the number is even or odd **and** positive or negative
- ***Produce the output on one line*** *(if you can't, this will be a small aspect)*

Sample run #1:

Please enter an integer numeric value: -12
This number is even and negative

Sample run #2:

Please enter an integer numeric value: 133
This number is odd and positive

Option 1:

```python
num = int(input("Please enter an integer numeric value: "))
if num % 2 == 0 and num > 0:
    print("This number is even and positive")
elif num % 2 == 0 and num < 0:
    print("This number is even and negative")
elif num % 2 == 1 and num > 0:
    print("This number is odd and positive")
elif num % 2 == 1 and num < 0:
    print("This number is odd and negative")
```

Option 2:

```python
def analyzeNum(num):
    if (num > 0):
        if (num % 2) == 0:
            print(num, "is even and positive")
        else:
            print(num, "is odd and positive")
    if (num < 0):
        if (num % 2) == 0:
            print(num, "is even and negative")
        else:
            print(num, "is odd and negative")

num = int(input("Please enter an integer numeric value: "))
analyzeNum(num)
```

Extra Credit #1

Electoral Votes by State (5 pts)

Make a copy of your exam2-1.py and name is **exam2-1ec.py** (use the File … Save As option in PyCharm).

- Modify the program so it allows **state abbreviations to be entered in lower case or upper case.**

Extra Credit #2

Earth's Atmosphere
With a User-Defined Function
(5 pts)

Make a copy of your exam2-2.py and name is **exam2-2ec.py** (use the File … Save As option in PyCharm).

- Modify the program so it **uses a user-defined function**.
- Ask for the **user input in the main** part of the program.
- Pass this user input (depth) into the user-defined function where the IF-ELIF statement will produce the output.

```python
def earthStructure(depth):
    if depth >= 0 and depth <= 35:
        print("You are in the Earth's crust")
    elif depth > 36 and depth <= 600:
        print("You are in the Earth's upper mantle")
    elif depth > 661 and depth <= 2890:
        print("You are in the Earth's lower mantle")
    elif depth > 2891 and depth <= 6360:
        print("You are in the Earth's core")
    else:
        print("This is an invalid depth")

depth = int(input("Please enter a depth in Earth: "))
earthStructure(depth)
```