1. In this course, all our labs involve paired programming. You do not have to keep the same partner for each lab, but you MUST work with someone in each lab, as specified in the student handout.

2. At this time, you need to pair with someone in the lab, and finish the rest of the lab as a pair.

Practice: Numbers, Logical Operators, and Variables (2 pts)

3. First, discuss how you would solve each expression based on precedence and hand write your answers to the following expressions. In addition, we will follow the standard in most programming languages, where integer arithmetic is a result from using only integers. The special operator for integer division, //, is a new feature of Python 3, but this is not typical in most languages. In the following expressions, assume integer division when a divide is between integers, when determining your answers.

Evaluate the following expressions:

- $4 \div 3 \div 2$
- $4 \div 3.0 \div 2$
- $1 \div 2 \times 8.0$
- $5 \times 10 \div 2 + 10 \div 5.0$
- $3 + 2 \times 4 \div 5 + 8 + 2$
- $(3 + 2) \times 4 \div (5 + 8) + 2$
- $(3 + 2) \times 4 \div 5 + (8 + 2)$
- $20.0 \div 4 \times 2^3$
- $5.5 \times 2 + 4 \div 2$
- false and true
- not false
- true or false
not true or false and false or true
not ((true or false) and (false or true))
not true and false
not (true and false)
false and not false or false

Using variables:

a = 0.0
b = 1.0
b – a ÷ 10
(b – a) ÷ 10
a = true
b = false
not a or not b

Now, look up the ASCII character set in a web browser. Determine the numbers that correspond to the letters in your full name. This includes a capital letter for your first and last name with a capital middle initial (if you have one) followed by a period, i.e. Jennifer Parham-Mocello or Jennifer R. Parham. Write down the numbers for both you and your partner.

Practice Python: Testing your solution (2 pts)

4. Write Python code, numbers_and_name.py, to test your handwritten solutions. Using integer division, i.e. // or type casting w/ int(), where appropriate, write a python program that prints the values of the above expressions based on the rules for integer arithmetic. Remember, the rule is that an operation between two integers produces an integer.

Example ways to write 1st expression:

print(4 // 3 // 2)
print(int(int(4 / 3) / 2))
**Note:** for the True/False expressions make sure to type them capitalized. (ex: True or False)

**Compare your handwritten solutions with your Python solutions** to see if you got the correct answer. For those answers where your handwritten solution differed from the Python solution, document what caused this error. For example, did your make a typo when entering the number in Python or a logical error when calculating your solution by hand?

Now, **write a python program that uses the ordinal values from the ASCII character set that you found for your full name in #3** and prints the characters corresponding to the values. Your name should come out with the letters beside each other and spaces between your first, middle initial, and last name. In other words, you do not want the print function to automatically insert a newline at the end.

**Example:**

```
print(chr(79), end="")
```

**Write a Program for Lab #3 Design (2pts)**

5. **Now, write a python program, gumballs.py, corresponding to your design in Lab #3.**

   The user provides the amount of coupons won as input and a program outputs how many candy bars and gumballs you can get. Remember, you can redeem 10 coupons for a candy bar or 3 coupons for a gumball, and you prefer candy bars to gumballs. Output how many candy bars and gumballs you get, when you spend all of your coupons on candy bars first and any remaining coupons on gumballs.

**Design and Write a Program (2pts)**

6. **Now, let’s design another program** that takes the weight (in pounds) and radius (in feet) of a sphere as input and outputs the buoyant force. Use $\gamma = 62.4 \text{ lb/ft}^3$ as the specific weight of water, and the volume of the sphere is $(4/3)\pi r^3$. The buoyant force can be computed by

$$F_b = V \times \gamma$$

where $F_b$ is the buoyant force, $V$ is the volume of the submerged object, and $\gamma$ is the specific weight of the fluid.

Now, **write the python program, buoyancy.py,** that uses your design.
Modify Buoyancy Design and Program (2pts)

7. How will your design for the buoyancy program change, if you want your program to inform the user if the sphere will sink or not? If \( F_b \) is greater than or equal to the weight of the object, then your program will output, “This sphere will float”, otherwise it will output, “This sphere will sink.”

Modify your design from above to print a message to the user based on the buoyant force and weight of the object.

Now get your lab checked off by your TA’s.

Practice Submitting your .py files to TEACH:
Since you have to get your assignment #3 and those following off the engr server and onto the TEACH website, then we should practice now. You have two options for this. You can transfer the file to your own computer, then upload it on TEACH (look into a free sftp application). Or, you can map a network drive, and choose the file from the mapped network drive. You want to map a network drive to the ENGR server. This allows you to directly work off the server as if it were a disk drive on your computer. You can follow these instructions to map a network drive for Windows or MacOS.

Windows:
http://engineering.oregonstate.edu/computing/fileaccess/windows_file_sharing/#map_network_drive

MacOS:
http://engineering.oregonstate.edu/computing/fileaccess/smb/

If you want to use the drive off campus, then you must download the Cisco VPN Client from OSU: http://oregonstate.edu/helpdocs/network/vpn-campus-access

Make sure you sign-up with a TA for demoing/explaining your Assignment #3 next week. This is how all assignments are graded in the course, and if you sign-up and do not make your appointment without rescheduling, then you will be penalized 50 points!!!