Unit 13

Conditional Statements / Selection

Asg 13.2 (Coding)

```
In [ ]:  # set up notebook to display multiple output in one cell

         from IPython.core.interactiveshell import InteractiveShell
         InteractiveShell.ast_node_interactivity = "all"

         print('The notebook is set up to display multiple output in one cell.')
```

> **Practice Problem 1**:
>
> The age of a dog in dog years can be calculated by multiplying the first 2 years by 10.5 and then adding to that the number of years over 2 multiplied by 4. For example, a dog that is 2 years old would be 2*10.5 = 21 dog years and a dog that is 5 years old would be 2*10.5 + 3*4 = 33 dog years. Write a simple program that contains an **if/else** conditional. Your program should prompt the user for their dog's name and age then convert the dog's age to dog years.
> Make sure to do the following:
>
> 1. Prompt the user to enter their dog's name and a second prompt to enter their dog's age ... refer to the sample output below for how to word your prompts. 2. Write an if/else statement that converts the dog's age to dog years. 3. Write a formatted print statement to print the dog's name and age in dog years ... refer to the output below for how to word your print statement. ![results%20dog.PNG](attachment:results%20dog.PNG)

```
In [2]:  dog_name = input("What is your dog's name? ")
         h_age = float(input("Input a dog's age in human years: "))

         if h_age < 0:
             print("Age must be positive number.")
         elif h_age <= 2:
             d_age = h_age * 10.5
         else:
             d_age = 21 + (h_age - 2)*4

         print(f"{dog_name.capitalize()} is {d_age} years old in dog years.")
```

```
What is your dog's name? charlie
Input a dog's age in human years: 10.5
Charlie is 55.0 years old in dog years.
```

> **Practice Problem 2**:

Suppose you want to determine the amount of time it would take to exercise if you want to burn a certain number of calories. The table below lists the number of calories burned per minute based on your weight for three types of exercise:

Calories burned per minute of exercise based on weight				
Activity	< 140 lb.	140 lb.	160 lb.	> 180 lb.
Cycling (10 mph)	5.5	6.4	7.3	8.2
Jogging	9.3	10.8	12.4	13.9
Swimming (moderate pace)	7.8	9.0	10.3	11.6

For this problem, write a program that prompts the user for their weight and the number of calories they would like to burn. Then use a **NESTED CONDITIONAL (not a CHAINED CONDITIONAL)** to return the number of minutes they would need to exercise for each of the three activities listed in the table.

In [1]:
```python
weight = int(input("What is your weight(in lbs)? "))
calorie_goal = float(input("How many calories would you like to burn? "))
cycling_minutes = 0.0
jogging_minutes = 0.0
swimming_minutes = 0.0
calorie_bpm = {
    "<140":{
        'Cycling': 5.5,
        'Jogging': 9.3,
        'Swimming': 7.8
    },
    "140":{
        'Cycling': 6.4,
        'Jogging': 10.8,
        "Swimming": 9.0
    },
    "160":{
        'Cycling': 7.3,
        'Jogging': 12.4,
        'Swimming': 10.3
    },
    ">180":{
        'Cycling': 8.2,
        'Jogging': 13.9,
        'Swimming': 11.6
    }

}
if(weight < 0):
    print("Weight cannot be negative")
else:
    if(weight <= 140):
        if(weight == 140):
            cycling_minutes = calorie_goal / calorie_bpm['140']['Cycling']
```

```
                jogging_minutes = calorie_goal / calorie_bpm['140']['Jogging']
                swimming_minutes = calorie_goal / calorie_bpm['140']['Swimming']
            if(weight < 140 and weight < 160):
                cycling_minutes = calorie_goal / calorie_bpm['<140']['Cycling']
                jogging_minutes = calorie_goal / calorie_bpm['<140']['Jogging']
                swimming_minutes = calorie_goal / calorie_bpm['<140']['Swimming']
        else:
            if(weight = 160 and weight < 180):
                cycling_minutes = calorie_goal / calorie_bpm['160']['Cycling']
                jogging_minutes = calorie_goal / calorie_bpm['160']['Jogging']
                swimming_minutes = calorie_goal / calorie_bpm['160']['Swimming']
            else:
                cycling_minutes = calorie_goal / calorie_bpm['180']['Cycling']
                jogging_minutes = calorie_goal / calorie_bpm['180']['Jogging']
                swimming_minutes = calorie_goal / calorie_bpm['180']['Swimming']

print(f"In order to burn {calorie_goal} calories at {weight} pounds:\n"
      f"Cycle at the speed of 10 miles per hour for {cycling_minutes:.2f} minutes\n"
      f"Jog for {jogging_minutes:.2f} minutes\n"
      f"Swim at a moderate pace for {swimming_minutes:.2f} minutes\n"
      )
```

```
What is your weight(in lbs)? 140
How many calories would you like to burn? 69
In order to burn 69.0 calories at 140 pounds:
Cycle at the speed of 10 miles per hour for 10.78 minutes
Jog for 6.39 minutes
Swim at a moderate pace for 7.67 minutes
```

Practice Problem 3:

Suppose you want to determine the amount of time it would take to exercise if you want to burn a certain number of calories. The table below lists the number of calories burned per minute based on your weight for three types of exercise:

Calories burned per minute of exercise based on weight				
Activity	< 140 lb.	140 lb.	160 lb.	> 180 lb.
Cycling (10 mph)	5.5	6.4	7.3	8.2
Jogging	9.3	10.8	12.4	13.9
Swimming (moderate pace)	7.8	9.0	10.3	11.6

For this problem, write a program that prompts the user for their weight and the number of calories they would like to burn. Then use a **CHAINED CONDITIONAL (not a NESTED CONDITIONAL)** to return the number of minutes they would need to exercise for each of the three activities listed in the table.

In [3]:
```
weight = int(input("What is your weight(in lbs)? "))
```

```python
calorie_goal = float(input("How many calories would you like to burn? "))
cycling_minutes = 0.0
jogging_minutes = 0.0
swimming_minutes = 0.0
calorie_bpm = {
    "<140":{
        'Cycling': 5.5,
        'Jogging': 9.3,
        'Swimming': 7.8
    },
    "140":{
        'Cycling': 6.4,
        'Jogging': 10.8,
        "Swimming": 9.0
    },
    "160":{
        'Cycling': 7.3,
        'Jogging': 12.4,
        'Swimming': 10.3
    },
    ">180":{
        'Cycling': 8.2,
        'Jogging': 13.9,
        'Swimming': 11.6
    }

}

if(weight < 140):
    cycling_minutes = calorie_goal / calorie_bpm['<140']['Cycling']
    jogging_minutes = calorie_goal / calorie_bpm['<140']['Jogging']
    swimming_minutes = calorie_goal / calorie_bpm['<140']['Swimming']
elif(weight == 140 and weight < 160):
    cycling_minutes = calorie_goal / calorie_bpm['140']['Cycling']
    jogging_minutes = calorie_goal / calorie_bpm['140']['Jogging']
    swimming_minutes = calorie_goal / calorie_bpm['140']['Swimming']
elif(weight == 160 and weight < 180):
    cycling_minutes = calorie_goal / calorie_bpm['160']['Cycling']
    jogging_minutes = calorie_goal / calorie_bpm['160']['Jogging']
    swimming_minutes = calorie_goal / calorie_bpm['160']['Swimming']
else:
    cycling_minutes = calorie_goal / calorie_bpm['180']['Cycling']
    jogging_minutes = calorie_goal / calorie_bpm['180']['Jogging']
    swimming_minutes = calorie_goal / calorie_bpm['180']['Swimming']

print(f"In order to burn {calorie_goal} calories at {weight} pounds:\n"
      f"Cycle at the speed of 10 miles per hour for {cycling_minutes:.2f} minutes\n"
      f"Jog for {jogging_minutes:.2f} minutes\n"
      f"Swim at a moderate pace for {swimming_minutes:.2f} minutes\n"
      )
```

```
What is your weight(in lbs)? 140
How many calories would you like to burn? 69
In order to burn 69.0 calories at 140 pounds:
Cycle at the speed of 10 miles per hour for 10.78 minutes
Jog for 6.39 minutes
Swim at a moderate pace for 7.67 minutes
```

Practice Problem 4: You will need the following two formulas to complete the next problem. For simplicity, we will assume payments would be made monthly and the interest would be compounded monthly. Use the following formula to calculate a monthly payment:

$$M = P\left[\frac{r(1+r)^n}{(1+r)^n - 1}\right] \qquad (1)$$

Use the following formula to calculate the loan amount:

$$P = M\left[\frac{(1+r)^n - 1}{r(1+r)^n}\right] \qquad (2)$$

In each case, the variables are defined as follows:

r = The annual interest rate converted to a decimal then divided by 12
n = The total number of monthly payments for the duration of the loan
P = The principal (or loan) amount
M = The monthly payment For example, to calculate the monthly payment on a 30-year loan of 200,000 dollars with an annual interest rate of 2.25\%, the variable amounts for the first formula would be:

$r =$ 0.0225/12 = 0.001875
$n =$ 360
$P =$ 200000

Which will result in a monthly payment of $M =$ 764.49 Conversely, to calculate how much you can borrow for 6 years with a monthly payment of 800 dollars and an annual interest rate of 3\%, the variable amounts for the second formula would be:

$r =$ 0.03/12 = 0.0025
$n =$ 72
$M =$ 800

This will result in a loan amount of $P =$ 52,653. _Test each of the above cases or the cases provided in the sample output below to make sure your formulas for problem #3 are working correctly._ *** For this problem, write a program that either calculates a loan payment (for a large purchase) or an amount the user can borrow based on a monthly payment amount they can afford. Specifically,

1. Prompt the user with the question "Would you like to calculate a payment (Y or N)?".
2. If the user enters Y or y to the prompt in #1, prompt the user to enter the loan amount, the number of months to pay back, and the annual interest rate and then calculate and print the payment amount. **_Note: For all prompts, handle the possibility of upper case and lower case entries._**
3. If the user enters N or n to the prompt in #1, prompt the user to confirm if they want to calculate the loan amount by asking them "Would you like to calculate the amount you

can borrow instead (Y or N)?".

4. If the user enters Y or y to the prompt in #3, prompt the user for the monthly payment they can afford, the number of months to pay back the loan, and the annual interest rate then calculate and print the amount they can borrow.

5. If the user enters N or n to #3, end with a simple "Goodbye!"

Be sure to complete each # TODO statement as indicated in the code cell below.

```
Answering Y or y to the initial prompt would look similar to this:

Would you like to calculate a payment (Y or N)? y
Enter the amount you are borrowing: 50000
Enter the duration of the loan in months: 60
Enter the annual interest rate: 2.5
Your monthly payment will be $887.37


Answering N or n to the initial prompt and Y or y to the next prompt would look similar to this:

Would you like to calculate a payment (Y or N)? n
Would you like to calculate the amount you can borrow instead (Y or N)? y
Enter the monthly payment you can afford: 750
Enter the duration of the loan in months: 60
Enter the annual interest rate: 2.5
You can borrow up to $42260


Answering N or n to both prompts would look similar to this:

Would you like to calculate a payment (Y or N)? n
Would you like to calculate the amount you can borrow instead (Y or N)? n
Goodbye!
```

In [1]:
```python
for i in range(3):
    payment_input = input("Would you like to calculate a payment? (Y or N) ")
    if(payment_input.lower() == 'y'):
        P = int(input("Enter the amount you are borrowing: "))
        n = int(input("Enter the total number of monthly payments for the duration of
        r = float(input("Enter the annual interest rate: "))
        r /= (12*100)
        monthly_payment = (P) * (  ( (r) * ((1+r)**n) ) / ( ((1+r)**n) -1   )   )
        print(f"Your monthly payment will be ${monthly_payment:.2f}")
        print("\n")
    if(payment_input.lower() == 'n'):
        borrow_input = input("Would you like to calculate the amount you can borrow in
        if(borrow_input.lower() == 'n'):
            print("Goodbye!")
            print("\n")
        if(borrow_input.lower() == 'y'):
            monthly_payment = int(input("Enter the montly payment you can afford: "))
            n = int(input("Enter the total number of montly payments for the duration
            r = float(input("Enter the annual interest rate: "))
            r /= (12*100)
            P = (monthly_payment) * (  ( ((1+r)**n) - 1 ) / ( (r) * ((1+r)**n) )   )
            print(f"You can borrow up to ${P:.2f}")
            print("\n")
```

```
Would you like to calculate a payment? (Y or N) Y
Enter the amount you are borrowing: 50000
Enter the total number of monthly payments for the duration of the loan: 60
Enter the annual interest rate: 2.5
Your monthly payment will be $887.37


Would you like to calculate a payment? (Y or N) n
Would you like to calculate the amount you can borrow instead? (Y or N) y
Enter the montly payment you can afford: 750
Enter the total number of montly payments for the duration of the loan: 60
Enter the annual interest rate: 2.5
You can borrow up to $42259.80


Would you like to calculate a payment? (Y or N) n
Would you like to calculate the amount you can borrow instead? (Y or N) n
Goodbye!
```