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Course: COSC 311

Program 1: Triangle Number Sequence

Part a)

```
# list comprehension method to find the triangle sequence  
a = [int(i*(i+1)/2) for i in range(1, 21)]  
print(a)
```

Part b)

```
# sum of even numbers  
print('Even Sum: ', sum(i for i in a if i%2 == 0), '\n', 'Odd Sum: ', sum(i for i in a if i%2 != 0))
```

Output:

Test 1:

a:

[1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91, 105, 120, 136, 153, 171, 190, 210]

b.

Even Sum: 880

Odd Sum: 660

Program 2: Weather tree

```
# function to figure out if you want to play tennis  
def playTennis(outlook, humidity, wind):  
    if outlook.lower() == 'sunny':  
        if humidity.lower() == 'high':  
            return False  
        elif humidity.lower() == 'normal':  
            return True  
    elif outlook.lower() == 'overcast':  
        return True
```

```
elif outlook.lower() == 'rain':  
    if wind.lower() == 'strong':  
        return False  
    elif wind.lower() == 'weak':  
        return True
```

```
Outlook = input('Please enter the outlook for the day: ')  
Humidity = input('Please enter the humidity for the day: ')  
Wind = input('Please enter the wind for the day: ')  
  
play = playTennis(Outlook, Humidity, Wind)  
if play == True:  
    print('You should go out and play tennis')  
elif play == False:  
    print("Today is not a tennis day")
```

Output:

```
Input:  
Outlook = Sunny, Humidity=High, Wind=Weak  
Output: Today is not a tennis day  
Input:  
Outlook = Overcast, Humidity=Normal, Wind=Strong  
output: You should go out and play tennis  
Input:  
Outlook = Rain, Humidity=High, Wind=Strong  
output: Today is not a tennis day
```

Program 3: Octagon in code

```
def printOctagon(Length):  
    stars = '*' * Length
```

```

sum = 0
middle = int(Length/2)
count = Length-2
for i in range(Length*3-1):
    if i < Length-1:
        print((count)*' ', stars + sum*'*')
        count-=1
        sum+=2
    elif i > Length-1 and i <= Length*2-1:
        count =0
        print(stars + '*'*(Length*2-2))
    elif i > Length*2-2:
        if sum == 2:
            print(count*' ',stars )
        else:
            sum-=2
            print(count*' ',stars + sum*'*' )
        count+=1

```

```

length = int(input('Enter the length of the octagon'))
while length < 2:
    length = int(input('Enter the length of the octagon'))
printOctagon(length)
length = int(input('Enter the length of the octagon'))
while length < 2:
    length = int(input('Enter the length of the octagon'))
printOctagon(length)

```

```

length = int(input('Enter the length of the octagon'))

while length < 2:

    length = int(input('Enter the length of the octagon'))

printOctagon(length)

```

Output:

```

Enter the length of the octagon2
  **
****
****
  **

Enter the length of the octagon1
Enter the length of the octagon1
Enter the length of the octagon1
Enter the length of the octagon0
Enter the length of the octagon3
  ***
*****
*****
*****
*****
  ***

Enter the length of the octagon5
  *****
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****

```

Program 4: Monte carlo simulations

```

from random import randint

## list and dictionary comprehension

dicelist = [randint(1, 6)+randint(1, 6) for i in range(int(input('Enter the number of times
you would like to roll the dice: ')))]

```

```
#print({key: value / n for key, value in {item: dicelist.count(item) for item in range(2, 13)}.items()})
```

```
print({item: dicelist.count(item)/sum([dicelist.count(item) for item in range(2, 13)]) for item in range(2,13)})
```

Output:

n = 100 {2: 0.03, 3: 0.03, 4: 0.07, 5: 0.11, 6: 0.1, 7: 0.2, 8: 0.22, 9: 0.09, 10: 0.09, 11: 0.02, 12: 0.04}

n = 100,000 {2: 0.02807, 3: 0.05427, 4: 0.08361, 5: 0.11089, 6: 0.13857, 7: 0.16715, 8: 0.13777, 9: 0.11244, 10: 0.084, 11: 0.05557, 12: 0.02766}