15-110 Refresher Session : Week 6

No Calculators, only Brains !!

1. **Loopy Transforms**
   Given a for loop, transform it into a while loop such that it performs the same function and renders the same output.

```
s = 0
for j in range(40, 1, -3) :
    if s % j  == 0 :
        return j
    s = s + j
return s
```

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2. **Act like a Computer**
   Given the following python function,

```
def ref_1(x):
    s = 0
    while x < 10 :
        for j in x , x :
            s = s + j
            if j % 3 == 0 :
                s = s * 3
        x += 2
    while s > 0 and s // 2 > 10 :
        s //= 2
    print(s)
```

What would the function print for each of the calls below ?

1. `ref_1(6)`
2. `ref_1(8)`
3. `ref_1(10)`

3. **Act like a programmer** Write a function `sumLimit(n)` which takes a number `n` and finds the positive integer x such that the sum from 1 to x is less than or equal to n. Let's say our n = 56, so 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55, which means the number 10 should be returned.

   `sumLimit(55)` returns `10`

   `sumLimit(1)` returns `1`

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4. **Act like a computer:**
   Given the function below

```
def ref_2(x) :
    counter = 0
    while x > 0 :
        for i in range (x, 0 , -20) :
            if x % 10 == 0 :
                if x % 3 == 0 :
                    x = x - 3
                elif x % 2 == 0 :
                    x = x - 2
                else:
                    x = x - 1
            else :
                x = x - 5
        x = x // 2
        counter = counter + 1
    return counter
```

   What would the function return when `ref_2(100)` is executed?

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5. **Act like a programmer:**
   A and B invented a game

   1. Nine tiles will be placed in front of 2 players (it is a 2-player game)
   2. Each tile will have a single digit number from 1-9 written on it
   3. Players takes turns to throw a ball
   4. The number on the tile which the ball falls on when it is thrown is the player's score
   5. Both players complete the same number of rounds.

   In this question, scores of both the players will be provided as an integer. For example, if scores = 23413434, 4 (rightmost digit) is player1's score in the first round, 3 is player2's score in the first round, 4 is player1's score in the second round, and so on. Your task is to implement a Python function `findWinner(scores)` which takes an integer `scores` representing the scores of both players and print `"Player 1 wins"` if the first player has higher score and `"Player 2 wins"` if the second player has the higher score. If both players have the same score, print `"It's a draw"`. Additionally it returns the number of rounds played in the game.

   `findWinner(23413434)` prints `"It's a Draw"` and returns `4`.

   `findWinner(9118)` prints `"Player 1 wins"` and returns `2`

6. **Additional Questions**

   (a) Implement a function reverse(n) which takes an integer and reverses it using while loop. For example `reverse(23221` returns `12232`.

   (b) *(Challenging with the concepts you have learnt - but give it a thought for now)* Use a resource to find how to convert decimal numbers to its binary form and then implement a function `decToBin(n)` which takes in an integer value of n and returns the binary form of it

   ```
   decToBin(2) returns 10

   decToBin(16) returns 1111
   ```