Assignment 4

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1. Write a Python program that will print your name 10 times.

In [ ]:
```
# Akash Duttachowdhury | 21052386
print("Akash Duttachowdhury\n"*10)
```

```
Akash Duttachowdhury
Akash Duttachowdhury
Akash Duttachowdhury
Akash Duttachowdhury
Akash Duttachowdhury
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Akash Duttachowdhury
```

2. Write a Python program that will print 1 2 3 4 5 6 7 8 9 10.

In [ ]:
```
# Akash Duttachowdhury | 21052386
for i in range(1,11):
    print(i)
```

```
1
2
3
4
5
6
7
8
9
10
```

3. Write a Python program that will print the number between m and n.

In [ ]:
```
# Akash Duttachowdhury | 21052386
m = int(input("Enter m: "))
n = int(input("Enter n: "))
print((m+n)/2)
```

```
7.5
```

4. Write a Python program that will print all odd number between m and n

In [ ]:
```
# Akash Duttachowdhury | 21052386
m = int(input("Enter m: "))
n = int(input("Enter n: "))
for i in range(m,n):
    if i%2 != 0:
        print(i)
```

```
3
5
7
9
11
13
15
17
```

5. Write a Python program that will print 9 7 5 3 1 -1 -3 -5 -7 -9

In [ ]:
```
# Akash Duttachowdhury | 21052386
for i in range(9,-10,-2):
    print(i)
```

```
9
7
5
3
1
-1
-3
-5
-7
-9
```

6. Write a Python program that will print sum of the following series

Sum = 1 + 1/2 + 1/3 + ... 1/n

In [ ]:
```
# Akash Duttachowdhury | 21052386
n = int(input("Enter n: "))
total = 0
for i in range(1,n+1):
    total += 1/i
print(f"Sum = {total}")
```

```
Sum = 2.9289682539682538
```

7. Write a Python program that will print sum of the following series

Sum = 1 + 1/2! + 1/3! ... + 1/n!

In [ ]:
```
# Akash Duttachowdhury | 21052386
```

```
def factorial(n):
    if n==0 or n==1:
        return 1
    else:
        return n * factorial(n-1)

n = int(input("Enter n: "))
total = 0
for i in range(1,n+1):
    total += 1/factorial(i)
print(f"Sum = {total}")
```

```
Sum = 1.7182818011463847
```

8. Write a Python program that will print sum of the following series
e^x = 1 + x + x^2/2! + x^3/3! + ... x^n/n!

In [ ]:
```
# Akash Duttachowdhury | 21052386
def factorial(n):
    if n==0 or n==1:
        return 1
    else:
        return n * factorial(n-1)

x = int(input("For e^x, Enter the value of x: "))
total = 0
for i in range(x):
    total += x**i/factorial(i)
print(f"e^{x} = {total}")
```

```
e^10 = 10086.573192239859
```

9. Write a Python program that will read x and compute sin(x).
(Hints: Use Taylor's series expansion)

In [ ]:
```
# Akash Duttachowdhury | 21052386
import math

def compute_sin(x, terms = 10):
    x = math.radians(x)
    result = 0

    for n in range(terms):
        term = ((-1)**n) * (x**(2*n+1)) / math.factorial(2*n+1)
        result += term

    return result

x = float(input("Enter the value of x in degrees: "))
sin_x = compute_sin(x)
print(f"sin({x} deg) = {sin_x}")
```

```
sin(45.0 deg) = 0.7071067811865475
```

10. Write a Python program that will read x and compute cos(x). (Hints: Use Taylor's series expansion)

In [ ]:
```python
# Akash Duttachowdhury | 21052386
import math

def compute_cos(x, terms = 10):
    x = math.radians(x)
    result = 0

    for n in range(terms):
        term = ((-1)**n) * (x**(2*n)) / math.factorial(2*n)
        result += term

    return result

x = float(input("Enter the value of x in degrees: "))
cos_x = compute_cos(x)
print(f"cos({x} deg) = {cos_x}")
```

```
cos(90.0 deg) = -3.3769215522516056e-15
```

11. Write a Python program that will check the number is prime or composite.

In [ ]:
```python
# Akash Duttachowdhury | 21052386
def is_prime(num) -> bool:
    if num < 2:
        return False
    for i in range(2, int(num**0.5) + 1):
        if num%i==0:
            return False
    return True

num = int(input("Enter a no.: "))
if is_prime(num):
    print(f"{num} is a prime number")
else:
    print(f"{num} is a composite number")
```

```
567 is a composite number
```

12. Write a Python program that will read two integers and compute GCD and LCM.

In [ ]:
```python
# Akash Duttachowdhury | 21052386
def compute_gcd(x, y):
    while y:
        x, y = y, x%y
    return abs(x)

def compute_lcm(x, y):
    return abs(x*y) // compute_gcd(x, y)
```

```
a = int(input("Enter the 1st integer: "))
b = int(input("Enter the 2nd integer: "))

print(f"LCM of {a} & {b} is {compute_lcm(a,b)}")
print(f"GCD of {a} & {b} is {compute_gcd(a,b)}")
```

```
LCM of 17 & 54 is 918
GCD of 17 & 54 is 1
```

13. Write a Python program that read an integer and print the number of digit.

In [ ]:
```
# Akash Duttachowdhury | 21052386
n = int(input("Enter an integer: "))
count = 0
while n>0:
    count += 1
    n = n//10
print(f"No. in digits is {count}")
```

```
No. in digits is 6
```

14. Write a Python program that will read a number and compute sum of the digit.

Ex: let num= 3456 output should be 18

In [ ]:
```
# Akash Duttachowdhury | 21052386
#compute sum of digits of the integer
n = int(input("Enter an integer: "))
total = 0
while n>0:
    temp = n%10
    total += temp
    n //= 10
print("Total =", total)
```

```
Total = 18
```

15. Write a Python program that will reverse an integer.

i.e. num =3456 reverse num=6543

In [ ]:
```
# Akash Duttachowdhury | 21052386
# reverse an integer
n = int(input("Enter an integer: "))
reverse = 0
while n>0:
    temp = n%10
    reverse =  temp + reverse*10
    n //= 10
print("Reverse =", reverse)
```

```
Reverse = 643271
```

16. Write a Python program that will check a number is palindrome or not.
i.e 12321 is a palindrome

In [ ]:
```python
# Akash Duttachowdhury | 21052386
# palindrome
def reversal(n):
    reverse = 0
    while n>0:
        temp = n%10
        reverse =  temp + reverse*10
        n //= 10
    return reverse


n = int(input("Enter a no.: "))
if n == reversal(n):
    print(n, "is a palindrome")
else:
    print(n, "is not a palindrome")
```

```
787878 is not a palindrome
```

17. Write a python program to find the Fibonacci series up to nth term.

In [ ]:
```python
# Akash Duttachowdhury | 21052386
def fibonacci(n):
  fib_sequence = [0, 1]
  while len(fib_sequence) < n:
      fib_sequence.append(fib_sequence[-1] + fib_sequence[-2])
  return fib_sequence

n = int(input("Enter n: "))
print(f"Fibonacci Sequence upto {n} no.s")
fibonacci(n)
```

```
Fibonacci Sequence upto 10 no.s
```

Out[ ]:
```
[0, 1, 1, 2, 3, 5, 8, 13, 21, 34]
```

18. Write a Python program to check the number is Armstrong or not.
For example, 371 is an Armstrong number since 333 + 777 + 111 = 371.

In [ ]:
```python
# Akash Duttachowdhury | 21052386
def is_armstrong(num):
    num_str = str(num)
    num_digits = len(num_str)

    armstrong_sum = sum(int(digit) ** num_digits for digit in num_str)

    return armstrong_sum == num

num = int(input("Enter a no.: "))
```

```
if is_armstrong(num):
    print(f"{num} is an Armstrong number")
else:
    print(f"{num} is not an Armstrong number")
```

```
371 is an Armstrong number
```

19. Write a Python program that will display the prime's number between M and N.

In [ ]:
```
# Akash Duttachowdhury | 21052386
def is_prime(num):
    if num<2:
        return False
    for i in range(2, int(num**0.5)+1):
        if num%i==0:
            return False
    return True

m = int(input("Enter starting value, M = "))
n = int(input("Enter the ending value, N = "))

prime = []

for num in range(m, n+1):
    if is_prime(num):
        prime.append(num)

print(f"Prime no.s between {m} and {n} are {prime}")
```

```
Prime no.s between 4 and 100 are [5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 4
1, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97]
```

20. Write a python program that will take a positive integer (num say) as input and display the positive numbers, which are less than num and relatively prime to num.

In [ ]:
```
# Akash Duttachowdhury | 21052386
def gcd(a, b):
    while b:
        a, b = b, a%b
    return a

def totient_function(num):
    count = 0
    for i in range(1, num):
        if (gcd(num, i)) == 1:
            count += 1
    return count

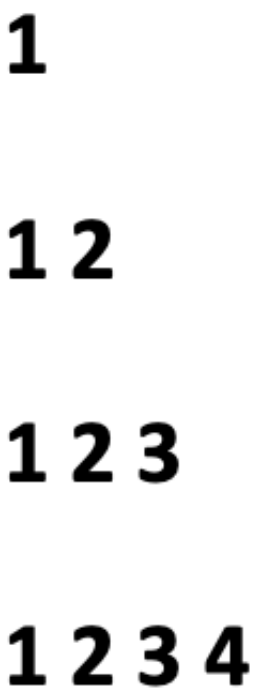
num = int(input("Enter a positive integer (num): "))

print(f"Positive no.s less than {num} and relatively prime to it are: ")
```

```
for i in range(1, num):
    if gcd(num, i) == 1:
        print(i)
```

```
Positive no.s less than 4 and relatively prime to it are:
1
3
```

21. Write python programs that will print the following output.



a.

In [ ]:
```
# Akash Duttachowdhury | 21052386
n = int(input("Enter the Number of Rows : "))

for i in range(1, n + 1):
    for j in range(1, i + 1):
        print(j, end=" ")
    print()
```

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
1 2 3 4 5 6
1 2 3 4 5 6 7
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10 11
1 2 3 4 5 6 7 8 9 10 11 12
1 2 3 4 5 6 7 8 9 10 11 12 13
1 2 3 4 5 6 7 8 9 10 11 12 13 14
```

```
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
```

```
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65
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29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67
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```
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
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54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
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29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
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29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
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29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
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29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81
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54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
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79 80 81 82 83 84 85
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54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
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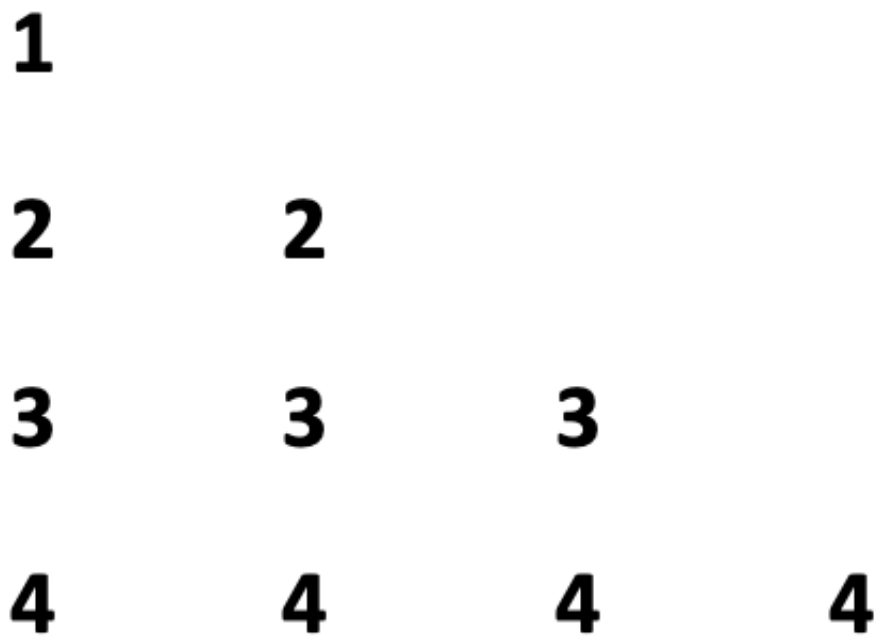
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90 91 92
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90 91 92 93
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
```

```
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78
79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
```



b.

In [ ]:
```python
# Akash Duttachowdhury | 21052386
n = int(input("Enter the Number of Rows : "))

for i in range(1, n + 1):
    for j in range(1, i + 1):
        print(i, end=" ")
    print()
```

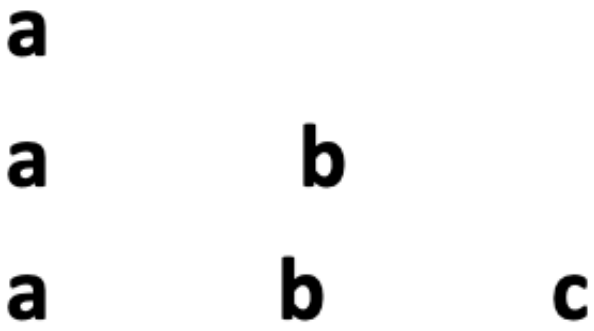
```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

c.

In [ ]:
```
# Akash Duttachowdhury | 21052386
width = int(input("Enter the Width : "))
height = int(input("Enter the Height : "))

for i in range(height):
    for j in range(width):
        if i == 0 or i == height - 1 or j == 0 or j == width - 1:
            print('A', end=' ')
        else:
            print(' ', end=' ')
    print()
```

```
A A A A A
A       A
A       A
A       A
A A A A A
```

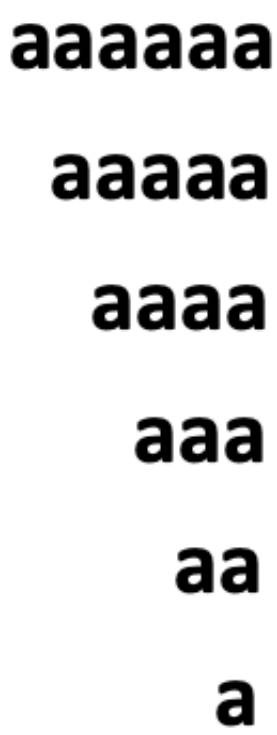


d.

In [ ]:
```
# Akash Duttachowdhury | 21052386
n = int(input("Enter the Number of Rows: "))

for i in range(1, n + 1):
    for j in range(0, i):
        print(chr(ord('a') + j), end=" ")
    print()
```

```
a
a b
a b c
a b c d
a b c d e
```

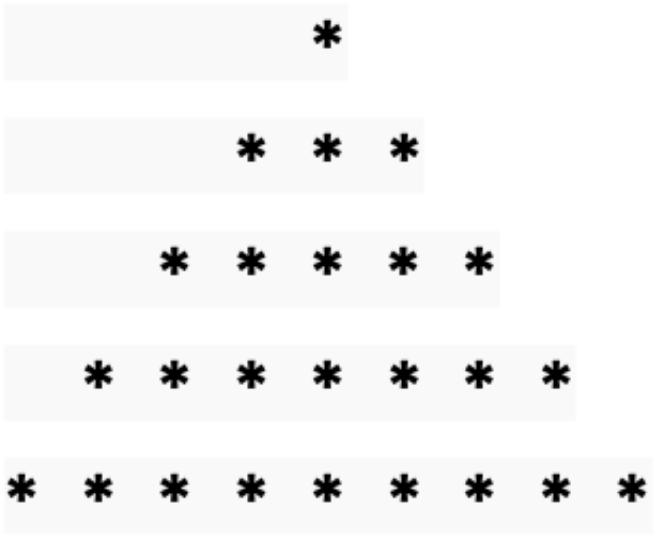


e.

In [ ]:
```
# Akash Duttachowdhury | 21052386
r = int(input("Enter the Number of Rows : "))

for i in range(r, 0, -1):
    spaces = " " * (r - i)
    print(spaces + 'a' * i)
```

```
aaaaa
 aaaa
  aaa
   aa
    a
```



f.

In [ ]:
```
# Akash Duttachowdhury | 21052386
rows = int(input("Enter the Number of Rows : "))

for i in range(1, rows + 1):
    spaces = " " * (rows - i)
    stars = "*" * (2 * i - 1)
    print(spaces + stars)
```

```
   *
  ***
 *****
*******
*********
```

g.

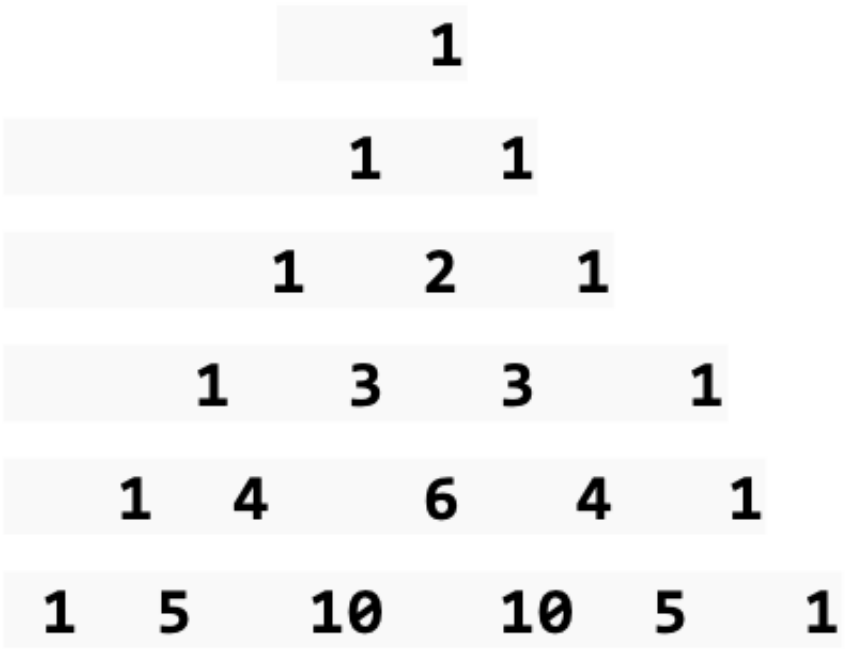
In [ ]:
```
# Akash Duttachowdhury | 21052386
rows = int(input("Enter the Number of Rows : "))
```

```
for i in range(1, rows + 1):
    for space in range(rows - i):
        print(" ", end=" ")

    current = i
    for j in range(1, i + 1):
        print(current, end=" ")
        current += 1
    current -= 2

    for j in range(i - 1, 0, -1):
        print(current, end=" ")
        current -= 1
    print()
```

```
      1
    2 3 2
  3 4 5 4 3
4 5 6 7 6 5 4
5 6 7 8 9 8 7 6 5
```



h.

In [ ]:
```
# Akash Duttachowdhury | 21052386
rows = int(input("Enter the Number of Rows : "))

for i in range(rows):
    for space in range(rows - i - 1):
        print(" ", end=" ")
    num = 1
    for j in range(i + 1):
        print(num, end=" ")
```

```
        num = num * (i - j) // (j + 1)

    print()
```

```
      1
     1 1
    1 2 1
   1 3 3 1
  1 4 6 4 1
```