LAB_1\euclidian_algorithm.py

```python

# 21CSE1003
# Ashish Singh
# LAB 1

#-------------------------------------------------------------------------------------

# Q1: Write a program to find the GCD of two large integer using Euclidian Algorithm.

def euclidian_algorithm(a, b):
    r = a % b
    while r != 0:
        a = b
        b = r
        r = a % b
    return b

a = int(input("Enter a: "))
b = int(input("Enter b: "))

print(f"\nThe greatest common divisor of {a} and {b} is {euclidian_algorithm(a, b)}.\n")

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LAB_1\extended_euclidian_algorithm.py

```python

# Q2: Write a program to find the GCD of two large integer using Extended Euclidian Algorithm.

def extended_euclidian_algorithm(a, b):
    if a >= b:
        r1, r2 = a, b
    else:
        r1, r2 = b, a
    t1, t2 = 1, 0
    s1, s2 = 0, 1
    q = r1 // r2
    r = r1 % r2
    t = t1 - q * t2
    s = s1 - q * s2
    while r != 0:
        r1 = r2
        r2 = r
        t1 = t2
        t2 = t
        s1 = s2
        s2 = s
        q = r1 // r2
        r = r1 % r2
        t = t1 - q * t2
        s = s1 - q * s2
    r1_coeff = t2
    r2_coeff = s2
    return r2, r1_coeff, r2_coeff

a = int(input("Enter a: "))
b = int(input("Enter b: "))

print(f"""\nThe greatest common divisor of {a} and {b} is {extended_euclidian_algorithm(a, b)[0]}.
The coefficients of a and b are {extended_euclidian_algorithm(a, b)[1]} and {extended_euclidian_algorithm(a, b)[2]} respectively.
The GCD can be represented as {extended_euclidian_algorithm(a, b)[1]}*{a} + {extended_euclidian_algorithm(a, b)[2]}*{b}.\n""")

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LAB_1\multiplicative_inverse_eea.py

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1
2  # Q3. Write a program to find Multiplicative Inverse of a inputted number using Extended
   Euclidian Algorithm.
3
4  def multiplicative_inverse_eea(a, b):
5      if a ⩾ b:
6          r1, r2 = a, b
7      else:
8          r1, r2 = b, a
9      t1, t2 = 1, 0
10     s1, s2 = 0, 1
11     q = r1 // r2
12     r = r1 % r2
13     t = t1 - q * t2
14     s = s1 - q * s2
15     while r =/= 0:
16         r1 = r2
17         r2 = r
18         t1 = t2
19         t2 = t
20         s1 = s2
21         s2 = s
22         q = r1 // r2
23         r = r1 % r2
24         t = t1 - q * t2
25         s = s1 - q * s2
26     return s2 if s2 > 0 else s2 + b
27
28 a = int(input("Enter a: "))
29 b = int(input("Enter b: "))
30
31
32
33 print(f"""\nMultiplicative Inverse of {a} in Z{b} is {multiplicative_inverse_eea(a,
   b)}.""")
34
```

LAB_1\multiplicative_inverse_A_in_Zn.py

```python

# Q4. Write a program to find Multiplicative Inverse of a inputted number A in Zn.

a = int(input("Enter A: "))
n = int(input("Enter n: "))

c = 1

while (a * c) % n != 1:
    c += 1

print(f"""\nMultiplicative inverse of {a} in Z{n} is {c}.""")

```

LAB_1\additive_inverse_A_in_Zn.py

```python

# Q5. Write a program to find Additive Inverse of a inputted number A in Zn.

a = int(input("Enter A: "))
n = int(input("Enter n: "))

for i in range(n//2+2):
    if (a + i) % n == 0:
        inverse = i
        break

print(f"""\nAdditive inverse of {a} in Z{n} is {inverse}.""")

```