P346 (Computational Physics Lab)
Assignment 3
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[1]:
```python
import mylibrary
```

Question 1

[2]:
```python
X = []
Y = []

mat_a = open("a.txt", "r+")
#calling matrix from txt file

for row in mat_a:
    #matrix structure is applied
    y = row.split()
    x = []
    for i in range(len(y)-1):
        x.append(float(y[i]))
    X.append(x)
    z = row.split()
    Y.append(float(z[len(y)-1]))

print("The solution to the system of linear equations is:")
soln = mylibrary.applyGJ(X, Y)
print("x = " + str(mylibrary.integerRound(soln[0])))
print("y = " + str(mylibrary.integerRound(soln[1])))
print("z = " + str(mylibrary.integerRound(soln[2])))
print("w = " + str(mylibrary.integerRound(soln[3])))
```

```
The solution to the system of linear equations is:
x = 2
y = 0
z = 6
w = 5
```

Question 2

[3]:
```python
M = []
N = []

mat_b = open("b.txt", "r+")
#calling matrix from txt file

for row in mat_b:
    #matrix structure is applied
```

```
    y = row.split()
    x = []
    for i in range(len(y)-1):
        x.append(float(y[i]))
    M.append(x)
    z = row.split()
    N.append(float(z[len(y)-1]))

print("The solution to the system of linear equations is:")
soln_2 = mylibrary.applyGJ(M, N)
print("x = " + str(mylibrary.integerRound(soln_2[0])))
print("y = " + str(mylibrary.integerRound(soln_2[1])))
print("z = " + str(mylibrary.integerRound(soln_2[2])))
```

```
The solution to the system of linear equations is:
x = 1
y = -2
z = -1
```

Question 3

[4]:
```
Q = []

mat_c = open("c.txt", "r+")
#calling matrix from txt file

for row in mat_c:
    x = row.split()
    y = []
    for i in range(len(x)):
        y.append(float(x[i]))
    Q.append(y)

print("Inverse of the matrix is: ")
Q_inv = mylibrary.inverseMatrix(Q)
mylibrary.displayMatrix(Q_inv)
```

```
Inverse of the matrix is:
[-0.33, 0.33, 0.33]
[-0.17, 0.17, 0.67]
[1.33, -0.33, -1.33]
```

[5]:
```
#we check the product of Q and Q_inv
Q_orig = []
mat_c_new = open("c.txt", "r+")

for row in mat_c_new:
    x = row.split()
```

```
    y = []
    for i in range(len(x)):
        y.append(float(x[i]))
    Q_orig.append(y)

mylibrary.displayMatrix(Q_orig)
mylibrary.displayMatrix(Q_inv)

mylibrary.productMatrix(Q_orig, Q_inv)
#this should return the identity matrix
#since we know that Q.Q^(-1) should be I
```

```
[0.0, 2.0, 1.0]
[4.0, 0.0, 1.0]
[-1.0, 2.0, 0.0]
[-0.33, 0.33, 0.33]
[-0.17, 0.17, 0.67]
[1.33, -0.33, -1.33]
[1.0, 0.0, 0.0]
[0.0, 1.0, 0.0]
[0.0, 0.0, 1.0]
```

Question 4

[7]:
```
S = []
mat_d = open("d.txt", "r+")                #opening the matrix m_4.

for value in mat_d:
    x = value.split()                      #splitting/seperating the matrix.
    y = []
    for i in range(len(x)):
        y.append(float(x[i]))              #float allows decimal values.
    S.append(y)

print("Determinant of given matrix is:")
mylibrary.findDeterminant(S)
```

```
Determinant of given matrix is:
65.0
```