MRI Programming Task Sheet #1

Supervision: Dr/ Inas Ahmed Yunis

Information

Team Members

```
Name: Marwa Abdallah
Sec: 2
BN: 28

Name: Menna Allah Hamdy
Sec: 2
BN: 35

Name: Fady Tadros
Sec: 2
BN: 13

Name: Mostafa Yehia
Sec: 2
BN: 33
```

Requirements to run the code

The following libraries should be installed first

```
pillow library (PIL)
    pip install pillow
qutip library
    pip install cython
    pip install qutip
sympy library
    pip install sympy
```

Equations

Magnetic Moment Equation1

> *µ = Gama * J*

```
µ is the magnetic moment vector
Gama is the gyromagnetic ratio
J is the angular momentum
```

Magnetic Moment Equation2

$\mu = Gama * (h\_bar * sqrt(I * (I + 1)))$

```
 I is the spin quantum number
h_bar is Planck's constant (h) divided by 2 pi
```

Bulk Vector Equation

$M\_vector = Sum(n = 1 \text{ to } Ns)\{ \mu n\_vector \}$

```
 M is the bulk magnetization vector
Ns is the number of spins
μ are the magnetic moment vectors
```

Bloch Equation

$Mz = M0 * (1 - exp(-t / T1)) \quad Mxy = M0 * exp(-t / T2)$

```
 M0: Static Magnetic Field
Mz: Longatudinal Magnetization
Mxy = Transverse Magnetization
T1: Recovery Time
T2: Decay Time
```