PART A

In [21]:

```
import numpy as np

poisson_ratio = 0.1
yield_strenght = [220, -320]
ultimate_strenght = [305, -410]

#Set everyhting in MPa
E = 200 *10e3

sigma_x, sigma_y = 50, 150
tau_xy = 150

compliance_matrix = np.array([[1/E, -poisson_ratio/E, 0],
                    [-poisson_ratio/E, 1/E, 0],
                    [0, 0, E/(2*(1+poisson_ratio))]])



strain_set = np.array([sigma_x, sigma_y, tau_xy]) @ compliance_matrix
strain_set
```

Out[21]:

```
array([1.75000000e-05, 7.25000000e-05, 1.36363636e+08])
```

In [22]:

```
stress_matrix = [[sigma_x, tau_xy],[tau_xy, sigma_y]]
eigenvalues = np.linalg.eigvals(stress_matrix)
eigenvalues
```

Out[22]:

```
array([-58.11388301, 258.11388301])
```

The material will have permanent deformation, but it will not break

The eigenvalues are: `eigenvalues` **The eigenvalues are:** `{{eigenvalues}}`

PART B

In [23]:

```
sigma_x, sigma_y = 150, 150
tau_xy = 50

stress_array = np.array([sigma_x, sigma_y, tau_xy])

strain_set = stress_array @ compliance_matrix
strain_set
```

Out[23]:

```
array([6.75000000e-05, 6.75000000e-05, 4.54545455e+07])
```

In [24]:

```
# Calculate eigenvalues of stress_array
stress_matrix = np.array([[sigma_x, tau_xy],
                          [tau_xy, sigma_y]])
```

```
eigenvalues = np.linalg.eigvals(stress_matrix)
eigenvalues
```

Out[24]:

```
array([200., 100.])
```

The material will not have permanent deformation