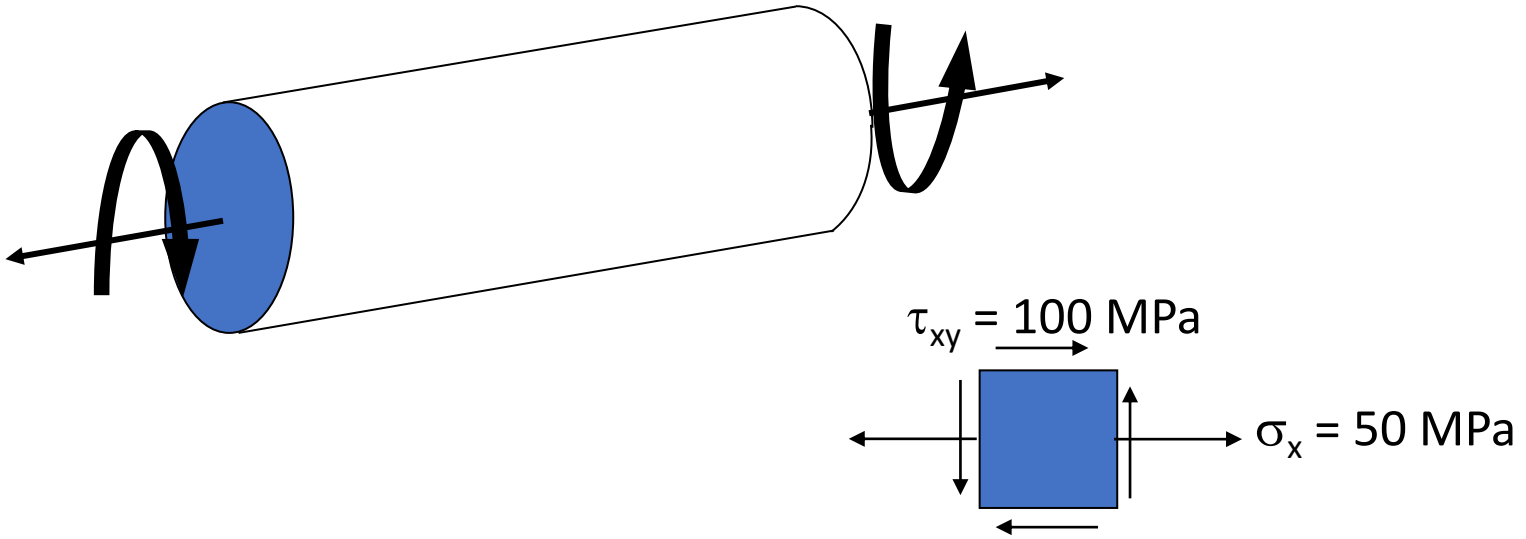
Design exercise 1

A round steel rod is subjected to axial tension of 50 MPa with a superimposed torsion of 100 MPa. Calculate the factor of safety with respect to initial yielding if the material has a tensile yield strength of 500 MPa using both maximum shear stress and distortion theories



Design exercise 2

A circular rod, constructed of a ductile material of tensile yield strength S_y = 300 MPa, is subjected to a torque $T = 500\pi$ Nm. Determine the axial tensile force P that can be applied simultaneously to the rod using the maximum shear stress failure criterion. Given: rod diameter D = 50mm, factor of safety n = 1.2.