PROBLEM 7.3
For the given state of stress, determine the normal and shearing stresses exerted on the oblique face of the shaded triangular element shown. Use a method of analysis based on the equilibrium of that element, as was done in the derivations of Sec. 7.2.

PROBLEM 7.19
A steel pipe of 12-in. outer diameter is fabricated from 1/2-in.-thick plate by welding along a helix that forms an angle of 22.5° with a plane perpendicular to the axis of the pipe. Knowing that a 40-kip axial force $P$ and an 80-kip-in. torque $T$, each directed as shown, are applied to the pipe, determine $\sigma$ and $\tau$ in directions, respectively, normal and tangential to the weld.

PROBLEM 7.22
Two steel plates of uniform cross section $10 \times 80$ mm are welded together as shown. Knowing that centric 100-kN forces are applied to the welded plates and that the in-plane shearing stress parallel to the weld is 50 MPa, determine (a) the angle $\beta$, (b) the corresponding normal stress perpendicular to the weld.
PROBLEM 7.25

The steel pipe $AB$ has a 102-mm outer diameter and a 6-mm wall thickness. Knowing that arm $CD$ is rigidly attached to the pipe, determine the principal stresses and the maximum shearing stress at point $K$.

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PROBLEM 7.26

The axle of an automobile is acted upon by the forces and couple shown. Knowing that the diameter of the solid axle is 32 mm, determine (a) the principal planes and principal stresses at point $H$ located on top of the axle, (b) the maximum shearing stress at the same point.

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PROBLEM 7.61

For the element shown, determine the range of values of $\tau_{xy}$ for which the maximum tensile stress is equal to or less than 60 MPa.
PROBLEM 7.73

For the state of stress shown, determine the maximum shearing stress when (a) $\sigma_z = 0$, (b) $\sigma_z = +45$ MPa, (c) $\sigma_z = -45$ MPa.

PROBLEM 7.76

For the state of plane stress shown, determine the value of $\tau_{xy}$ for which the maximum shearing stress is (a) 10 ksi, (b) 8.25 ksi.

PROBLEM 7.112

The pressure tank shown has an 8-mm wall thickness and butt-welded seams forming an angle $\beta = 20^\circ$ with a transverse plane. For a gage pressure of 600 kPa, determine (a) the normal stress perpendicular to the weld, (b) the shearing stress parallel to the weld.
PROBLEM 7.119

Square plates, each of 0.5-in. thickness, can be bent and welded together in either of the two ways shown to form the cylindrical portion of a compressed-air tank. Knowing that the allowable normal stress perpendicular to the weld is 12 ksi, determine the largest allowable gage pressure in each case.