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| 3-18, For each of the stress states listed below, find all three principal normal and shear stresses. Draw a complete Mohr’s three-circle diagram and label all points of interest.  (*a*) *x =* -80 MPa, *y* =-30 MPa, *xy* = 20 MPa cw        Y  R  C  (*b*)  *x =* -30 MPa, *y* =-60 MPa, *xy =* 30 MPa cw    R  Y  C  (*c*)  *x =* 40 MPa, *z =* -30 MPa, *xy =* 20 MPa ccw      (*d*)  *x =* 50 MPa, *z =* -20 MPa, *xy =* 30 MPa cw | {NOTE: that the axis for all of these plots are will the negative in the **downward direction**}    Y    C  R      Y  C  R |

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| 3-44 For the beam shown, determine      (*b*) the maximum shear stress due to *V*, and      (*c*) the maximum shear stress in the beam.  This should happen at the neutral surface or close to it  All at the point **27 in**    maximum shear 74.55 psi | (*a*) the maximum tensile and compressive bending stresses,  MAX tensile Stress is **5294.11 PSI**  MAX compressive Stress is **-7444.88 PSI** |

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| 3-62 A 40-mm-diameter solid steel shaft, used as a torque transmitter, is replaced with a hollow shaft having a 40-mm OD and a 36-mm ID. If both materials have the same strength, what is the percentage reduction in **torque** transmission? What is the **percentage** **reduction** in shaft weight? | the percentage reduction in torque: 65.61%  the percentage reduction in shaft weight: 81% |