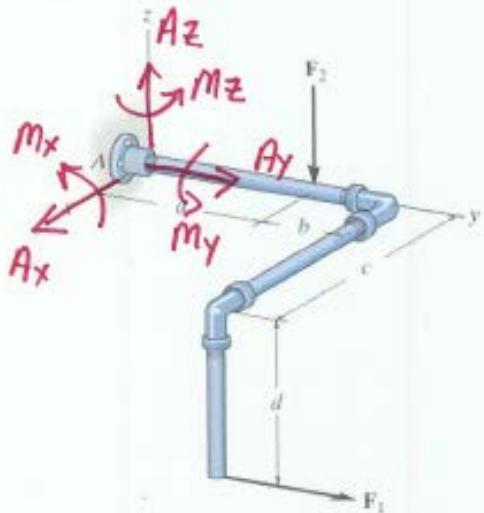## 3D Equilibrium I Problem 1

Determine the *x, y, z* components of reaction at the fixed wall A. The 150-N force is parallel to the *z* axis, and the 200-N force is parallel to the *y* axis.

NONCON CURRENT
6 EQNS
6 UNKNOWNS

ΣM_A TO ELIMINATE 3 UNKNOWNS
$A_x, A_y + A_z$

FORCES, Mom REACTIONS	$\vec{r}_{PT \to F}$	$\vec{F}$	$\vec{r} \times \vec{F}$ COUPLES + MOMENT REACTIONS
200 N	$[2.5 \quad 3 \quad -2]$	$[0 \quad 200 \quad 0]$	$[400 \quad 0 \quad 500]$
150 N	$[0 \quad 2 \quad 0]$	$[0 \quad 0 \quad -150]$	$[-300 \quad 0 \quad 0]$
FORCES @ A	$[0 \quad 0 \quad 0]$	$[A_x \quad A_y \quad A_z]$	$[0 \quad 0 \quad 0]$
MOMENTS @ A	——	$\uparrow \quad \uparrow \quad \uparrow$ $\Sigma F_x \quad \Sigma F_y \quad \Sigma F_z$	$[M_x \quad M_y \quad M_z]$ $\uparrow \quad \uparrow \quad \uparrow$ $\Sigma M_x \quad \Sigma M_y \quad \Sigma M_z$

EQNS OF EQUILIBRIUM

$\Sigma F_x = 0 = 0 + 0 + A_x \Rightarrow A_x = 0$
$\Sigma F_y = 0 = 200 + 0 + A_y \Rightarrow A_y = -200 N$
$\Sigma F_z = 0 = 0 - 150 + A_z \Rightarrow A_z = 150 N$

$\Sigma M_x = 0 = 400 - 300 + 0 + M_x$
$\qquad\qquad M_x = -100 \, N\cdot m$
$\Sigma M_y = 0 = \quad 0 + 0 + 0 + M_y$
$\qquad\qquad M_y = 0$
$\Sigma M_z = 0 = 500 + 0 + 0 + M_z$
$\qquad\qquad M_z = -500 \, N\cdot m$

$\vec{A} = [0 \quad -200 \quad 150] \, N$
$\vec{M}_A = [-100 \quad 0 \quad -500] \, N\cdot m$