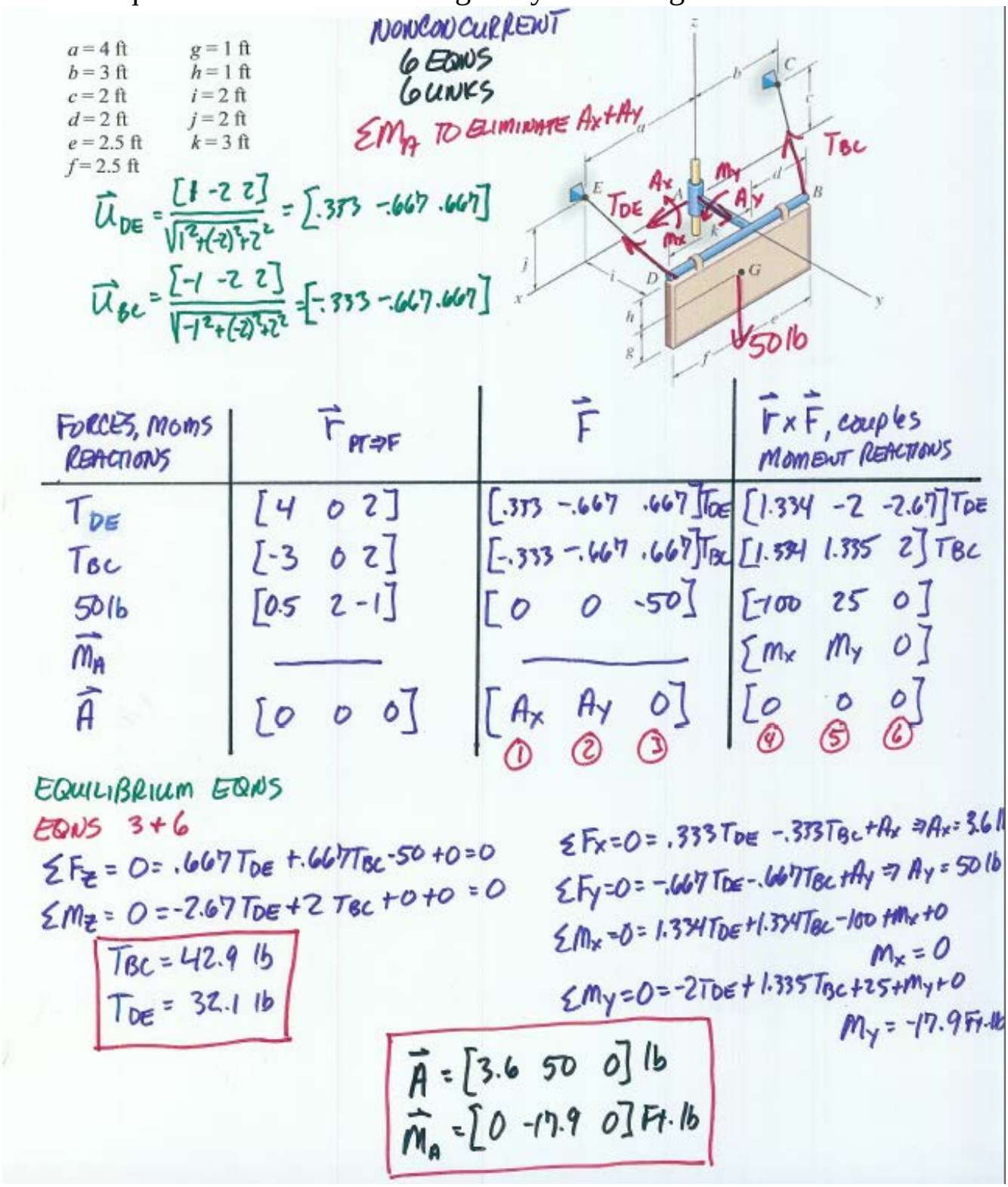
3D Equilibrium II Problem 1

Determine the tensions in the cables and the components of reaction acting on the smooth collar at *A* necessary to hold the sign of weight *W* = 50 lb in equilibrium. The center of gravity for the sign is at ***G***.



FORCES, MOMS REACTIONS	$\vec{r}_{PT\Rightarrow F}$	$\vec{F}$	$\vec{r}\times\vec{F}$, couples MOMENT REACTIONS
T_{DE}	[4 0 2]	[.333 -.667 .667] T_{DE}	[1.334 -2 -2.67] T_{DE}
T_{BC}	[-3 0 2]	[-.333 -.667 .667] T_{BC}	[1.334 1.335 2] T_{BC}
50 lb	[0.5 2 -1]	[0 0 -50]	[-100 25 0]
$\vec{M}_A$	———	———	[M_x M_y 0]
$\vec{A}$	[0 0 0]	[A_x A_y 0] ① ② ③	[0 0 0] ④ ⑤ ⑥

EQUILIBRIUM EQNS

EQNS 3+6

$\Sigma F_z = 0 = .667 T_{DE} + .667 T_{BC} - 50 + 0 = 0$

$\Sigma M_z = 0 = -2.67 T_{DE} + 2 T_{BC} + 0 + 0 = 0$

$T_{BC} = 42.9$ lb

$T_{DE} = 32.1$ lb

$\Sigma F_x = 0 = .333 T_{DE} - .333 T_{BC} + A_x \Rightarrow A_x = 3.6$ lb

$\Sigma F_y = 0 = -.667 T_{DE} - .667 T_{BC} + A_y \Rightarrow A_y = 50$ lb

$\Sigma M_x = 0 = 1.334 T_{DE} + 1.334 T_{BC} - 100 + M_x + 0$

$M_x = 0$

$\Sigma M_y = 0 = -2 T_{DE} + 1.335 T_{BC} + 25 + M_y + 0$

$M_y = -17.9$ Ft-lb

$\vec{A} = [3.6 \ 50 \ 0]$ lb

$\vec{M}_A = [0 \ -17.9 \ 0]$ Ft-lb