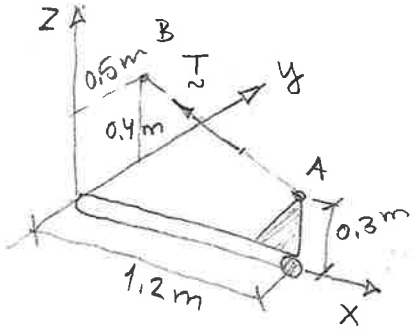
Seminarie pass 6

1)



$T = 2kN$, $\underset{\sim}{T} = T\,\underset{\sim}{e}_{AB}$

$\overline{AB} = (0, 0.5, 0.4) - (1.2, 0, 0.3)$

$= (-1.2, 0.5, 0.1)$

$|\overline{AB}| = 1.304 \Rightarrow$

$\underset{\sim}{e}_{AB} = (-0.920, 0.383, 0.0767)$

Dvs $\underset{\sim}{T} = (-1.84, 0.766, 0.153)$ kN

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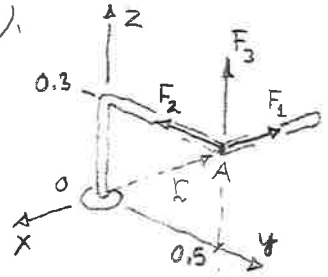
2)



Flytta krafterna längs verkningslinjerna så de hamnar i A.

$\underset{\sim}{M}_0 = \underset{\sim}{r} \times \underset{\sim}{F}$ med $\underset{\sim}{r} = \overrightarrow{OA}$

och $\underset{\sim}{F} = (-F_1, -F_2, F_3)$

Vektorn $\underset{\sim}{r} = (0, 0.5, 0.3)$ (i m) $\Rightarrow$

$$\underset{\sim}{M}_0 = \begin{vmatrix} \underset{\sim}{e}_x & \underset{\sim}{e}_y & \underset{\sim}{e}_z \\ 0 & 0.5 & 0.3 \\ -100 & -20 & 30 \end{vmatrix} = \begin{matrix} \overset{+}{\underset{\sim}{e}_x} & \overset{+}{\underset{\sim}{e}_y} & \overset{+}{\underset{\sim}{e}_z} & \overset{-}{\underset{\sim}{e}_x} & \overset{-}{\underset{\sim}{e}_y} & \overset{-}{\underset{\sim}{e}_z} \\ 0 & 0.5 & 0.3 & 0 & 0.5 & 0.3 \\ -100 & -20 & 30 & -100 & -20 & 30 \end{matrix} =$$

$= \underset{\sim}{e}_x \cdot 0.5 \cdot 30 + \underset{\sim}{e}_y \cdot 0.3 \cdot (-100) + \underset{\sim}{e}_z \cdot 0 +$

$- \underset{\sim}{e}_x \cdot 0.3 (-20) - \underset{\sim}{e}_y \cdot 0 \quad - \underset{\sim}{e}_z \cdot 0.5 \cdot (-100) =$

$= (15+6, -30, 50)$

Alltså $\underset{\sim}{M}_0 = (21, -30, 50)$ Nm

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2 forts.

Alt. Direkt beräkning

- Kraften F_1: moment map y & z *)

$\underset{\sim}{M}_1 = (0, -0.3 \cdot 100, 0.5 \cdot 100) = (0, -30, 50)$ Nm

- Kraften F_2: moment map x enbart

$\underset{\sim}{M}_2 = (0.3 \cdot 20, 0, 0) = (6, 0, 0)$ Nm

- Kraften F_3: moment map x enbart

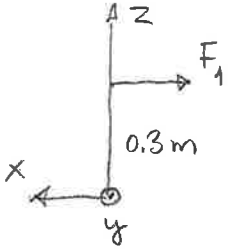
$\underset{\sim}{M}_3 = (0.5 \cdot 30, 0, 0) = (15, 0, 0)$ Nm

Totalt $\underset{\sim}{M}_0 = \underset{\sim}{M}_1 + \underset{\sim}{M}_2 + \underset{\sim}{M}_3 = (21, -30, 50)$ Nm

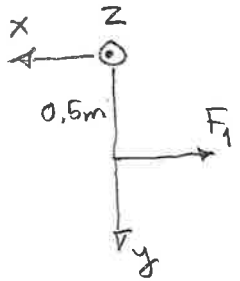
Dvs samma svar

*) Projektioner:

F_1 map y

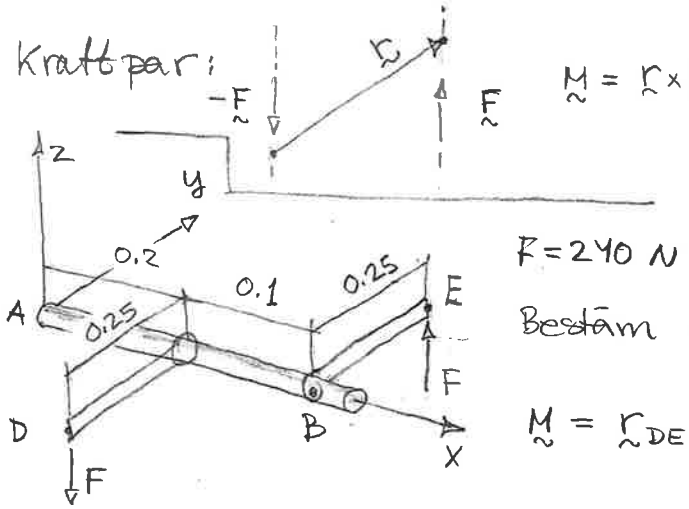


F_1 map z



($F_1 = 100N$)

3) Kraftpar:



$\underset{\sim}{M} = \underset{\sim}{r} \times \underset{\sim}{F}$

$F = 240\ N$

Bestäm M_x o M_y.

$\underset{\sim}{M} = \underset{\sim}{r}_{DE} \times \underset{\sim}{F}_{upp}$

$\underset{\sim}{r}_{DE} = (0.1, 0.5, 0)m$, $\underset{\sim}{F}_{upp} = (0, 0, 240)\ N$

$\underset{\sim}{M}$:

+	+	+	−	−	−
$\underset{\sim}{e}_x$	$\underset{\sim}{e}_y$	$\underset{\sim}{e}_z$	$\underset{\sim}{e}_x$	$\underset{\sim}{e}_y$	$\underset{\sim}{e}_z$
0.1	0.5	0	0.1	0.5	0
0	0	240	0	0	240

$\Rightarrow$

$\underset{\sim}{M} = \underset{\sim}{e}_x \cdot 0.5 \cdot 240 - \underset{\sim}{e}_y\, 0.1 \cdot 240 = (120, -24, 0)\ Nm$

(Alt.1) Direkt beräkning av kraftparets komponenter

kring x: $M_x = F \cdot 0.5m = 120\ Nm$

kring y: $M_y = -F \cdot 0.1\ m = -24\ Nm$

Dvs samma resultat

3 forts

Alt.2 Räkna moment map godtycklig pkt för var och en av krafterna Välj tex pkten B:

F_{ner}: $(0.25 \cdot 240, -0.1 \cdot 240, 0)$

F_{upp}: $(0.25 \cdot 240, 0, 0)$

$\Rightarrow$

$\underset{\sim}{M} = (0.5 \cdot 240, -24, 0)$ samma.