Repeat the calculations using pt. D as your "pivot" pt.

$\therefore \quad \vec{M}_D = \vec{r}_{DA} \times \vec{F}_A$

Therefore, your "moment arm" $= \vec{r}_{DA}$ = from D to A

end pt. A (0, 6, 5)
− start pt. D (4, 1, 2)

$$\vec{r}_{DA} = -4\hat{i} + 5\hat{j} + 3\hat{k}$$

The Force Vector is the same, $\vec{F}_{AB} = -4.1\hat{i} - 6.144\hat{j} - 3.072\hat{k}$

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -4 & 5 & 3 \\ -4.1 & -6.144 & -3.072 \end{vmatrix} = \hat{i}\left[(5)(-3.072) - (3)(-6.144)\right] - \hat{j}\left[(-4)(-3.072) - (3)(-4.1)\right] + \hat{k}\left[(-4)(-6.144) - (5)(-4.1)\right]$$

$$\vec{M}_D = 3.072\hat{i} - 24.588\hat{j} + 45.076\hat{k}$$
$$\doteq 3.07\hat{i} - 24.6\hat{j} + 45.08\hat{k} \quad \text{N-m}$$

Now do the Dot Product. $\left[M_D \cdot \lambda_{CD}\right]$

$= \left[(3.07)(0.535) + (-24.6)(-0.267) + (45.08)(0.802)\right]$

$= 44.365$ N-m Scalar Magnitude ✓

$M_{\text{Line}_{CD}} = 44.365\ \lambda_{CD}$

$= 23.735\hat{i} - 11.845\hat{j} + 35.58\hat{k}$

Vector Form ⟹ Same Results.

M. Lang

Bonus HW:

$M_{\text{Line}_{CD}} = M_{pt_C}$ from C to pt. B

and $= M_{pt_D}$ from D to pt. B