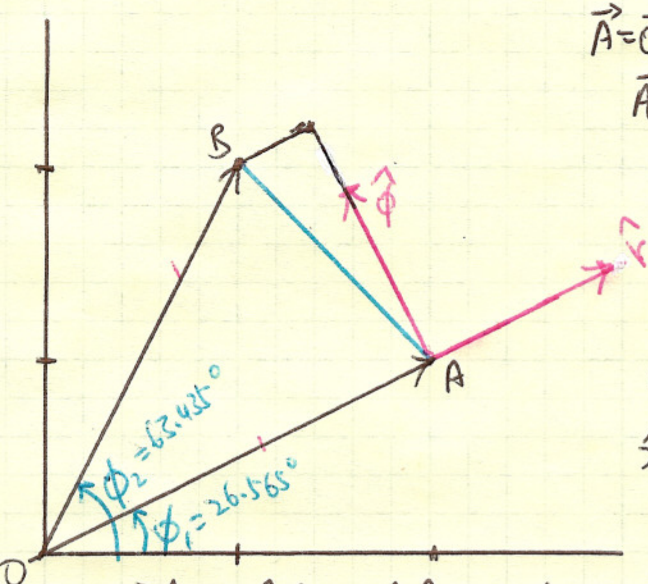

$\vec{A} = \vec{OA} = 2\hat{x} + \hat{y},\ \vec{B} = \vec{OB} = \hat{x} + 2\hat{y}$

$\vec{AB} = \vec{OB} - \vec{OA} = -\hat{x} + \hat{y}$

$\phi_1 = \tan^{-1}\frac{1}{2} = 26.565°$

$\cos\phi_1 = 0.8944\ ,\ \sin\phi_1 = 0.4472$

$\phi_2 = \tan^{-1} 2 = 63.435°$

$\cos\phi_2 = 0.4672 \quad \sin\phi_2 = 0.8944$

$\hat{x} = \hat{r}\cos\phi - \hat{\phi}\sin\phi,\ \hat{y} = \hat{r}\sin\phi + \hat{\phi}\cos\phi$

$A_r = \vec{A}\cdot\hat{r} = A_x\hat{x}\cdot\hat{r} + A_y\hat{y}\cdot\hat{r} = A_x\cos\phi_1 + A_y\sin\phi_1 = 2\cos\phi_1 + \sin\phi_1 = 2.236$

$A_\phi = \vec{A}\cdot\hat{\phi} = A_x\hat{x}\cdot\hat{\phi} + A_y\hat{y}\cdot\hat{\phi} = -2\sin\phi_1 + \cos\phi_1 = 0$

$\therefore \vec{OA} = \vec{A} = A_x\hat{x} + A_y\hat{y} = A_r\hat{r} = \underline{2\hat{x} + \hat{y} = 2.236\hat{r}}$

$B_r = \vec{B}\cdot\hat{r} = \hat{x}\cdot\hat{r} + 2\hat{y}\cdot\hat{r} = \cos\phi_2 + 2\sin\phi_2 = 2.236$

$B_\phi = \vec{B}\cdot\hat{\phi} = \hat{x}\cdot\hat{\phi} + 2\hat{y}\cdot\hat{\phi} = -\sin\phi_2 + 2\cos\phi_2 = 0$

$\therefore \vec{OB} = \vec{B} = B_x\hat{x} + B_y\hat{y} = B_r\hat{r} = \underline{\hat{x} + 2\hat{y} = 2.236\hat{r}}$

FOR $\vec{AB} = \vec{B} - \vec{A} = -\hat{x} + \hat{y}$, WHAT IS $\vec{AB}$ IN CYLINDRICAL CO.?