

S.P. 2-J

For $\mathbf{F}(\mathbf{r}) = y\hat{\mathbf{a}}_x - x\hat{\mathbf{a}}_y + x\hat{\mathbf{a}}_z$, find the value of $\int_{P_1}^{P_2} \mathbf{F} \cdot d\boldsymbol{\ell}$ where $P_1 = (0,0,0)$,
 $P_2 = (4,6,2)$:

- along the straight-line path $P_1 \rightarrow P_2$
- along a straight path from $P_1 \rightarrow (1,4,1)$, followed by the straight path $(1,4,1) \rightarrow P_2$
- along a curved path $P_1 \rightarrow P_2$ where $y = \frac{3}{8}x^2$ and $z = \frac{1}{32}x^3$