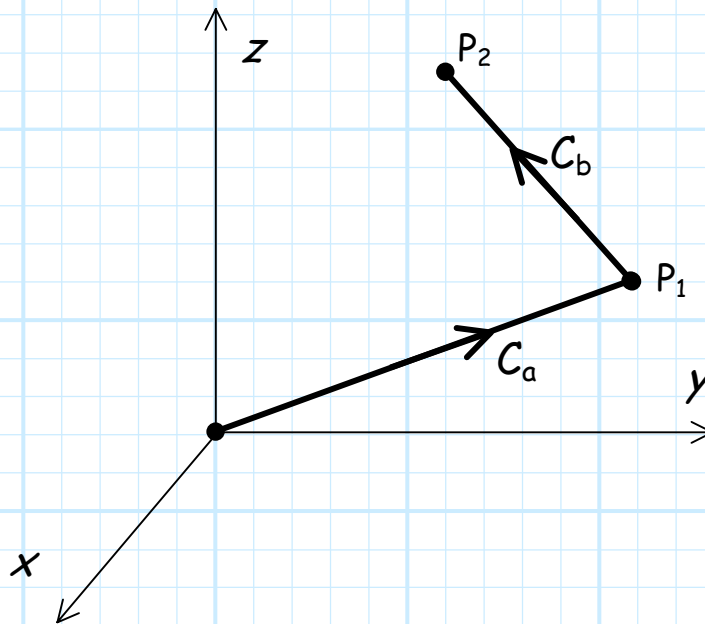


### Special Problem 2-5.12

Consider the vector field  $\mathbf{A}(\bar{\mathbf{r}}) = \nabla(\rho^2 z)$ , and contours  $C_a$  and  $C_b$ :



Contour  $C_a$  starts at the **origin** and **ends** at point  $P_1$ , whereas contour  $C_b$  **starts** at point  $P_1$  and **ends** at point  $P_2$ .

The location of point  $P_2$  is denoted by the **position vector** :

$$\bar{\mathbf{r}}_2 = 2 \hat{\mathbf{a}}_y + 3 \hat{\mathbf{a}}_z.$$

If:

$$\int_{C_a} \mathbf{A}(\bar{\mathbf{r}}) \cdot \overline{d\ell} = 5$$

then find the value of integral:

$$\int_{C_b} \mathbf{A}(\bar{\mathbf{r}}) \cdot \overline{d\ell}$$