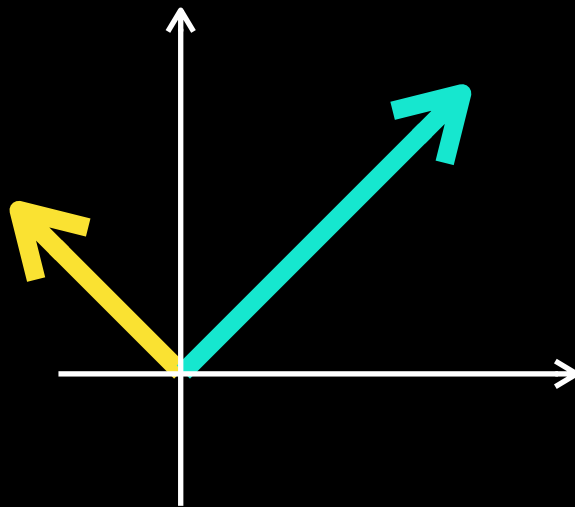


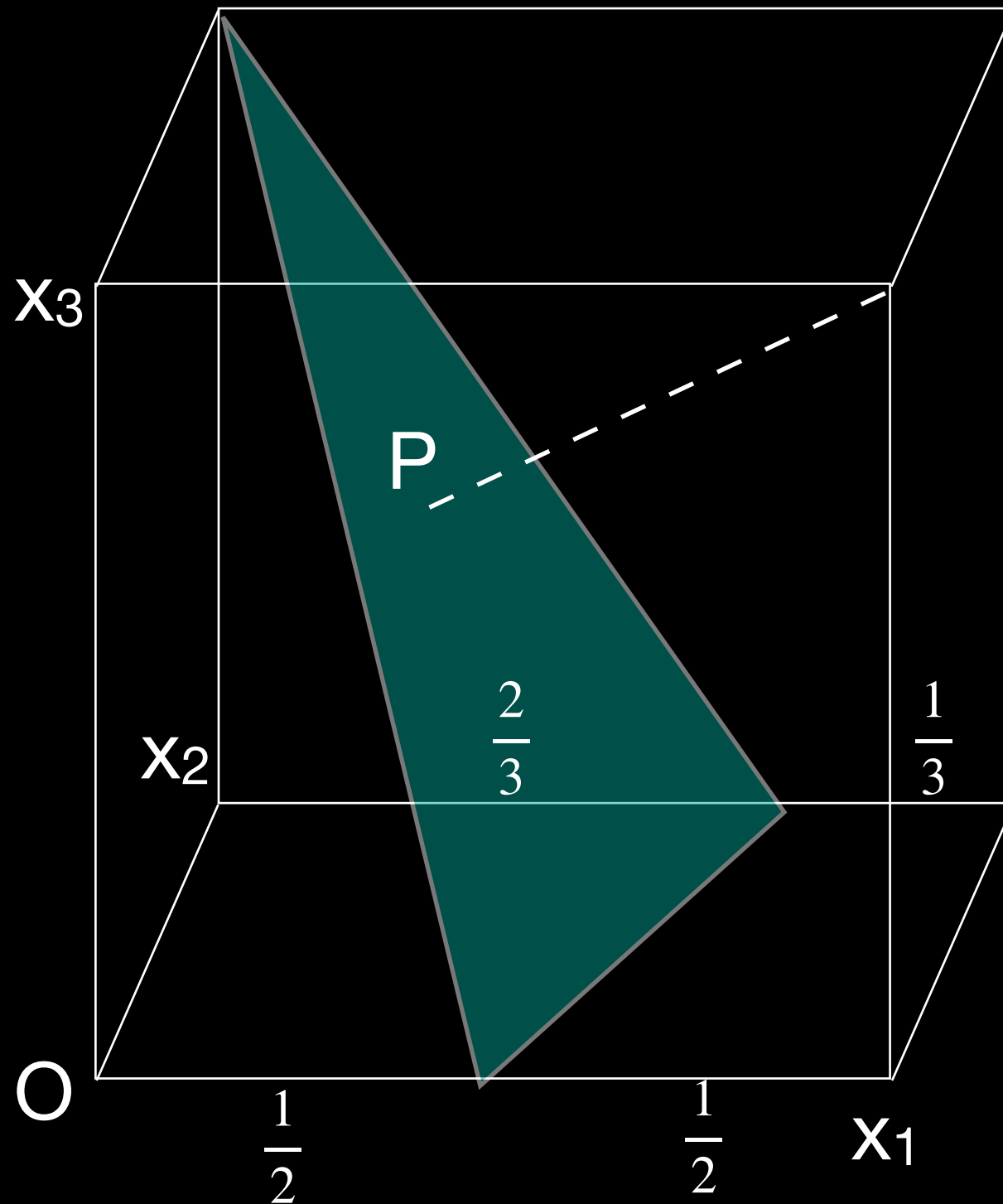
Example: projection

Linear Algebra Essentials



A unit cube

Find the coords of P



$$y = x - [1/2, 0, 0]$$

$$x_1 \rightarrow y_1 = x_1 - 1/2$$

$$x_2 \rightarrow y_2 = x_2$$

$$x_3 \rightarrow y_3 = x_3$$

$$\mathbf{a}_1 = [1/6, 1, 0]$$

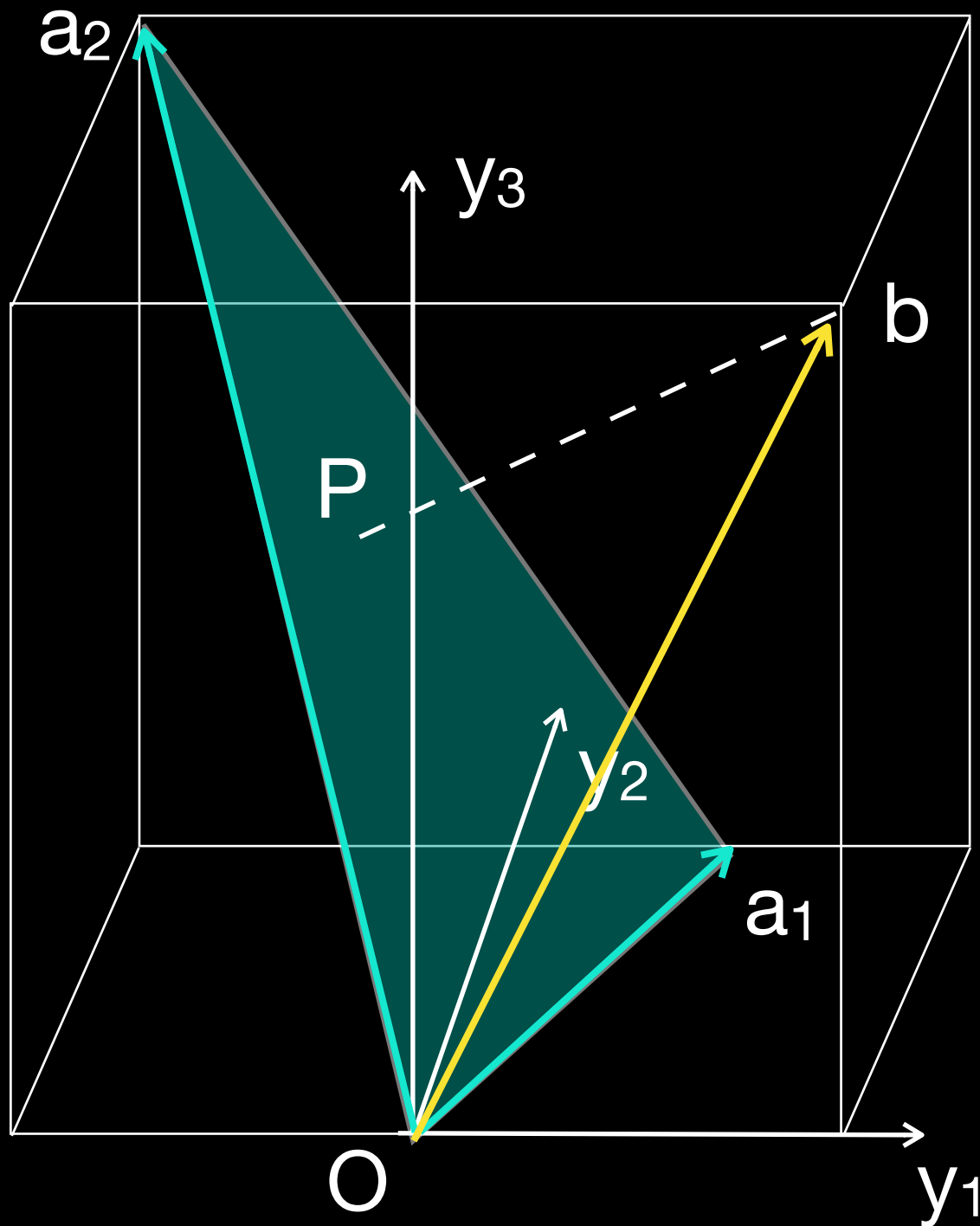
$$\mathbf{a}_2 = [-1/2, 1, 1]$$

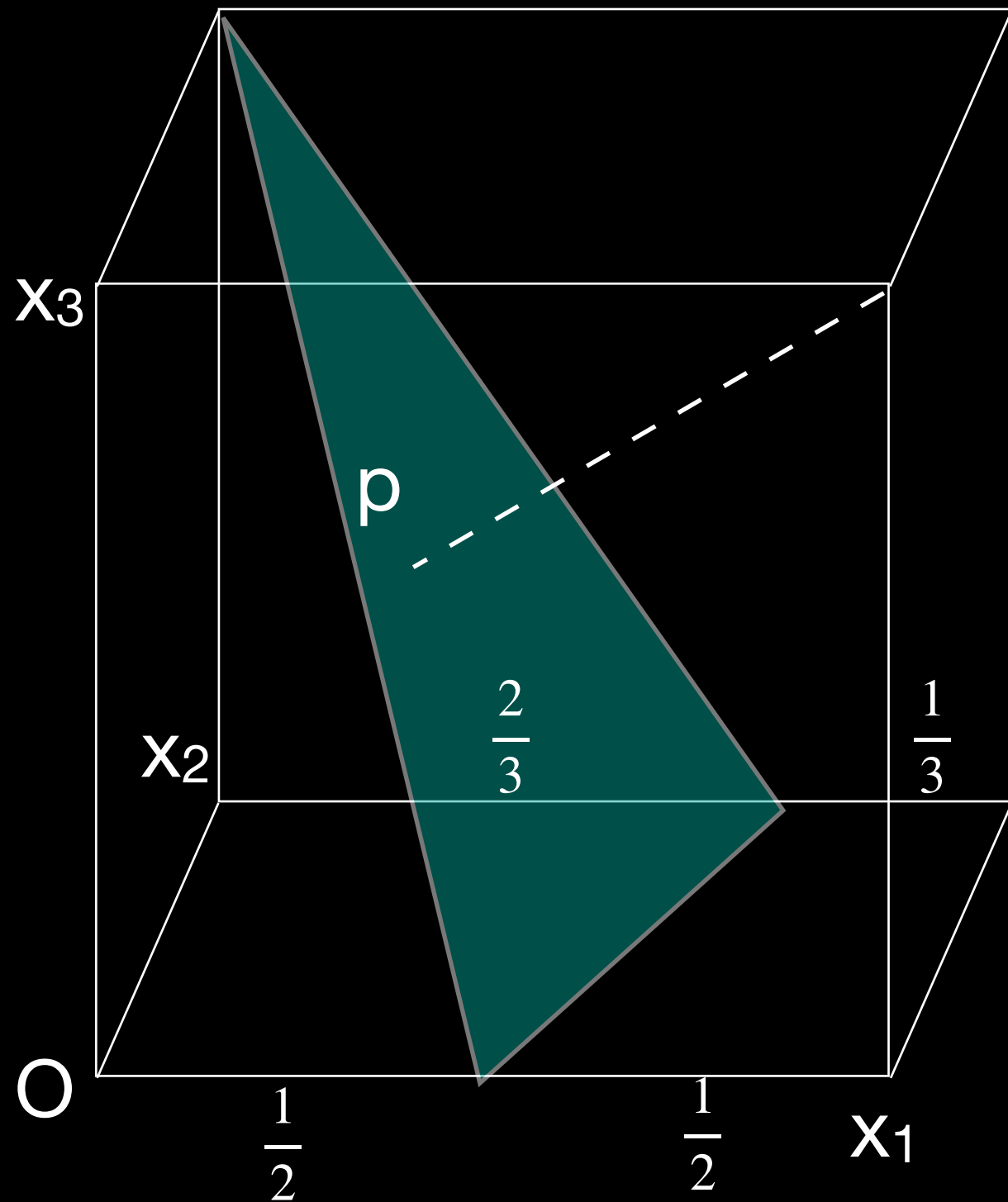
$$\mathbf{A} = [\mathbf{a}_1 \ \mathbf{a}_2]$$

$$\mathbf{A} = \begin{bmatrix} \frac{1}{6} & -\frac{1}{2} \\ 1 & 1 \\ 0 & 1 \end{bmatrix}$$

$$\mathbf{b} = [1/2, 0, 1]$$

$$\mathbf{P} = \mathbf{A} (\mathbf{A}^T \mathbf{A})^{-1} \mathbf{A}^T$$





$$p = [0.21, 0.13, 0.47]$$

```
1 A = np.array([[1/6, -1/2],
2               [1, 1],
3               [0, 1]])
```

```
1 P = A.dot(np.linalg.inv(A.T.dot(A))).dot(A.T)
2 P.round(2)
```

```
array([[ 0.32,  0.11, -0.45],
       [ 0.11,  0.98,  0.08],
       [-0.45,  0.08,  0.7 ]]) = P
```

```
1 b = np.array([1/2, 0, 1])
```

```
1 p = P.dot(b)
2 p.round(5)
```

```
array([-0.29245,  0.13208,  0.4717 ])
```

$$y = x - [1/2, 0, 0]$$

$$x = y + [1/2, 0, 0]$$