7. Matrix examples

7.1. Geometric transformations

Let us create a rotation matrix, and use it to rotate a set of points $\pi/3$ radians (60 deg). The result is in Figure 7.1.

In [ ]:
```
Rot = lambda theta: [[np.cos(theta), -np.sin(theta)],
[np.sin(theta), np.cos(theta)]]
R = Rot(np.pi/3)
R
```

Out[ ]:
```
[[0.5000000000000001, -0.8660254037844386],
 [0.8660254037844386, 0.5000000000000001]]
```

In [ ]:
```
#create a list of 2-D points
points =
↪  np.array([[1,0],[1.5,0],[2,0],[1,0.25],[1.5,0.25],[1,0.5]])
#Now rotate them
rpoints = np.array([R @ p for p in points])
#Show the two sets of points
import matplotlib.pyplot as plt
plt.ion()
plt.scatter([c[0] for c in points], [c[1] for c in points])
plt.scatter([c[0] for c in rpoints],[c[1] for c in rpoints])
plt.show()
```

7.2. Selectors

Reverser matrix. The reverser matrix can be created from an identity matrix by reversing the order of its rows. The numpy function `np.flip()` can be used for this purpose.