LQR (Problem statement)
Linear Quadratic Regulator (LQR) ~ total cost

\[
\int_{t_0}^{\infty} \left( x(t)^T Q x(t) + u(t)^T R u(t) \right) dt
\]

subject to

\[
\dot{x}(t) = A x(t) + B u(t) \quad \text{ constraints}
\]

\[
x(t_0) = x_0
\]

The minimizer (i.e., the input that achieves minimum cost) is

\[
u(t) = -K x(t)
\]

and the minimum (i.e., the minimum cost) is

\[
x_0^T P x_0
\]

where \( K \) and \( P \) can be found in python as follows:

```python
def lqr(A, B, Q, R):
    P = linalg.solve_continuous_are(A, B, Q, R)
    K = linalg.inv(R) @ B.T @ P
    return K, P
```