

For this dynamical system,

$$x_{k+1} = x_k + 3u_k, \quad x_0 = 10,$$

find u_0^*, u_1^* and then x_1^*, x_2^* such that $J = \sum_{k=0}^1 u_k^2 + 2x_k^2$ is minimized, using the principle of optimality and dynamic programming.