宿題 3-5

We consider the optimal control problem of finite state systems.

$$\inf_{\substack{u(\tau)\in U \\ \tau\in T}} J(t_0, x_0; u(\cdot))$$

where

$$J(t_0, x_0; u(\cdot)) = \sum_{\tau=t_0}^{t_\mathrm{f}-1} \ell(x(\tau), u(\tau)) + \ell_\mathrm{f}(x(t_\mathrm{f}))$$

and

$$x(t) \in X = \{x_1, x_2, \ldots, x_n\}$$
$$u(t) \in U = \{u_1, u_2, \ldots, u_m\}$$
$$t \in T = \{t_0, t_0 + 1, \ldots, t_\mathrm{f}\}$$

$$\phi: \ X \times U \to X \qquad\qquad x(t+1) = \phi(x(t), u(t))$$
$$\ell: \ X \times U \to \mathbb{R} \qquad\qquad \ell(x(t), u(t))$$
$$\ell_\mathrm{f}: \ X \to \mathbb{R} \qquad\qquad \ell_\mathrm{f}(x(t_\mathrm{f}))$$

problem: Develop a computer program that compute the cost-to-go.

- for simplicity, we shall assume that all states can occur at every time-stage.
- you can choose any computer language.
- you should provide a list of program source code, as well as, execution results.
- the execution results should be provided for a variety of problem sizes.
- the program source code should be provided with a rich comment for explanations. This significantly helps the instructor to understand your program source code.
- oh dear, your programming has not been completed! It is ok, probably. You should submit your homework report with partial results, and it should also be explained what a difficulty with you. The instructor may give you a partial score.