7FNCE025 High Frequency Trading

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Week 4 Seminar Questions

Let the state equation be

$$\frac{dy(t)}{dt} = ry(t) + w - c(t) \tag{1}$$

where $y(t)$ is wealth at time t, r is the risk-free rate, w denotes wages, and $c(t)$ consumption. The agents's problem is to

$$\max_c \int_t^T e^{-\rho s} h(c(s)) ds\,, \tag{2}$$

and he faces the constraint $y(T) \geq 0$, i.e. the agent is restricted to end with non-negative cash at time T.

Before trying to solve the optimisation problem we ask ourselves:

1. What amount of initial cash does the restriction $y(T) \geq 0$ implies?
2. What is the maximum amount of cash that the agent can end up with at time T?