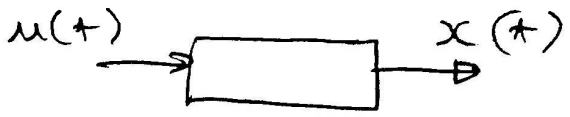
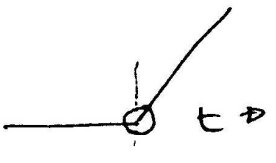
4.1(a) Consider the following differential equation:



$$\frac{dx}{dt} = -2x + 3u$$

where u is a unit ramp  $u = 1.t \quad (t \geq 0)$, $u = 0 \quad (t < 0)$

Integrate from $t = 0$ to $t = 5$ numerically with $\Delta t = 1$, starting at $x(0) = 0$, using:

(i) Explicit Euler
(ii) Implicit based on $\frac{dx}{dt}$ at the end of each step
(iii) Implicit based on $\frac{dx}{dt}$ at the centre of each step.
(iv) Analytical (↳ use 'average')
(v) ..... Now compare (i) to (iv).