7b) $\frac{d}{dx}\int_x^2 (7-6t)^4\,dt$ or $\frac{d}{dx}\left\{\left[\frac{(7-6t)^5}{-30}\right]_x^2\right\}$

$= -(7-6x)^4$

$= \frac{d}{dx}\left\{\frac{5^5}{30} - \frac{(7-6x)^5}{-30}\right\}$

$= 0 - \frac{5(7-6x)^4(-6)}{-30}$

$= -(7-6x)^4$

7c) (i) $V(x) = (a-x)U(x) + \int_0^x U(t)\,dt$

$V'(x) = (a-x)u(x) - U(x) + U(x)$

$= (a-x)u(x)$

(ii) $\int_0^a (a-x)u(x)\,dx = \left[(a-x)U(x) + \int_0^x U(t)\,dt\right]_0^a$

$= \int_0^a U(t)\,dt - aU(x) - \int_0^0 U(t)\,dt$

$= \int_0^a U(x)\,dx - aU(x)$

$\int_0^a U(x)\,dx = aU(x) + \int_0^a (a-x)u(x)\,dx$

c) $V(x) = (a-x)U(x) + \int_0^x U(t)\,dt$

$V'(x) = (a-x)U'(x) + (U(x))(-1) + U(x)$

$= (a-x)U'(x)$

(iii) $\int_0^a (a-x)U'(x)\,dx = \left[(a-x)U(x)\right]_0^a + \left[\int_0^x U(t)\,dt\right]_0^a$

$= -aU(a) + \int_0^a U(t)\,dt - 0$

$= -aU(0) + \int_0^a U(x)\,dx$

$\int_0^a U(x)\,dx = aU(0) + \int_0^a (a-x)U'(x)\,dx$