6.2 Section hw Questions #35 and #39

(35) $\int x(x-2)^5\,dx$

* Find (u) value
$u = x-2$
$du = dx$

$= \int (x-2)^5$ $\quad x\,dx$ ← extra (x), so cannot use (u)-substitution

Double substitution needed because we had an extra (x).

if $u = x-2$; $u+2 = x$

$\int (x-2)^5$ becomes $= u^5$

Distribute =

$\int u^5(u+2)\,du = \int u^6 + 2u^5\,du$

$= \int \frac{u^7}{7} + \frac{2u^6}{6} + C$ * Simplify & return the (u's) to (x's)

$= \frac{(x-2)^7}{7} + \frac{(x-2)^6}{3} + C$

(39) $\int \left(\frac{e^{-0.05x}}{1-e^{-0.05x}}\right) dx$

Can we use add ⇒ divide?
NO b/c more complicated.
Can we use u-substitution?
Let's try!! Find u-value
$u = 1-e^{-0.05x}$
$du = -e^{-0.05x} * (-0.05)\,dx$
$= 0.05e^{-0.05x}\,dx$

this is an (ln) rule b/c to 1st power

$\frac{1}{0.05}\int \frac{1}{1-e^{-0.05x}}\ 0.05\ e^{-0.05x}\,dx$

$$= \frac{1}{0.05} \ln|1 - e^{-0.05x}| + C = \boxed{20 \ln|1 - e^{-0.05x}| + C}$$

* Most integration problems use the (u) substitution method *