PROBLEM 2.57

Each line of the following table gives data, in Btu, for a process of a closed system. Determine the missing table entries, in Btu.

Process	Q	W	E_1	E_2	ΔE
a	+40		+15		+15
b		+5	+7	+22	
c	-4	+10		-8	
d	-10		-10		+20
e	+3	-3	+8		

Process	Q	W	E_1	E_2	ΔE
a	+40	***-25***	+15	***+30***	+15
b	***+20***	+5	+7	+22	***+15***
c	-4	+10	***+6***	-8	***-14***
d	-10	***-30***	-10	***+10***	+20
e	+3	-3	+8	***+14***	***+6***

$\Delta E = Q - W$

Process a:
$W = Q - \Delta E = +40 - (+15) = -25$ Btu ←
$\Delta E = E_2 - E_1$
$E_2 = \Delta E + E_1 = +15 + (+15) = +30$ Btu ←

Process b:
$\Delta E = E_2 - E_1 = 22 - 7 = +15$ Btu ←
$Q = \Delta E + W = +15 + 5 = +20$ Btu ←

Process c:
$\Delta E = Q - W = (-4) - (10) = -14$ Btu ←
$E_1 = E_2 - \Delta E = (-8) - (-14) = 6$ Btu ←

Process d:
$W = Q - \Delta E = (-10) - (+20) = -30$ Btu ←
$\Delta E = E_2 - E_1$
$E_2 = \Delta E + E_1 = +20 + (-10) = +10$ Btu ←

Process e:
$\Delta E = Q - W = +3 - (-3) = +6$ Btu ←
$E_2 = \Delta E + E_1 = (+6) + (+8) = +14$ Btu ←