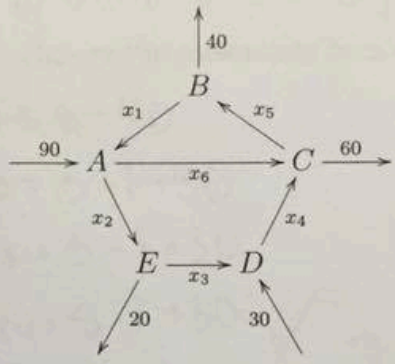
5. Consider the network of streets with intersections A, B, C, D and E below. The arrows indicate the direction of traffic flow along the **one-way streets**, and the numbers refer to the **exact** number of cars observed to enter or leave A, B, C, D and E during one minute. Each x_i denotes the unknown number of cars which passed along the indicated streets during the same period.



(a) Write down a system of linear equations which describes the the traffic flow, together with all the constraints on the variables x_i, $i = 1, \ldots, 6$.

(Do not perform any operations on your equations: this is done for you in (b). Do not simply copy out the equations implicit in (b). You will not get any marks if you do this.)

Flow In = Flow out

A: $x_1 + 90 = x_2 + x_6$

B: $x_5 = x_1 + 40$

C: $x_4 + x_6 = 60 + x_5$

D: $x_3 + 30 = x_4$ ✓

E: $x_2 + 20 = x_3$

$\forall x_i \geq 0$ ✓

$\forall x_i \in \mathbb{Z}$

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