Walras' law

First:

Def Excess demand function:

$$z(p) = \sum_{h \in H} (\underbrace{x_h(p)}_{\text{demand}} - \underbrace{e_h}_{\text{supply}})$$

$$z : \underset{\text{prices}}{\mathbb{R}^N_+} \to \underset{\text{quantities}}{\mathbb{R}^N_+}$$

Note: p^* is an equilibrium price vector $\iff z(p^*) = \begin{bmatrix} 0 \\ \vdots \\ 0 \end{bmatrix}$.

Theorem (Walras law)

Consider a pure-exchange economy $(u_h, e_h)_{h \in H}$, and let z be the corresponding excess demand function.

(i) $p \cdot z(p) = 0$ for all $p \in \mathbb{R}^N_{++}$.

(ii) If $N-1$ markets clear, then all markets clear.

(iii) If p is not an eq. price vector then there is excess demand in one market and excess supply in another market.