EXERCISE 1. Consider Th$(\mathbb{Q}, \text{cyc})$, where

$$\mathbb{Q} \models \text{cyc}(a, b, c) \Leftrightarrow (a < b < c) \vee (b < c < a) \vee (c < a < b).$$

Show that for $a \neq b$, cyc(a, x, b) divides over $\emptyset$. Show that $x = x$ forks over $\emptyset$, but does not divide over $\emptyset$.

EXERCISE 2. Let $\phi(x, y)$ be stable. Show that $\phi(x, b)$ does not divide over A if and only if it is satisfiable in every model containing A.
Now, consider a stable theory T. Let $p \in S_x(B)$ and let $A \subseteq B$. Show that the following are equivalent:

- p does not fork over A;
- there is a global type extending p which is $\text{acl}^{eq}(A)$-invariant;
- there is a global type extending p which is $\text{acl}^{eq}(A)$-definable.

EXERCISE 3. Show the following are equivalent:

- tp(a/Ab) does not divide over A;
- For every infinite A-indiscernible sequence I such that $b \in I$, there is some $a' \equiv_{Ab} a$ such that I is Aa'-indiscernible;
- For every infinite A-indiscernible sequence I such that $b \in I$ there is some $J \equiv_{Ab} I$ such that J is Aa-indiscernible.

EXERCISE 4. Use the above exercise to show the following property of dividing:
Suppose tp(a/B) does not divide over $A \subseteq B$ and tp(b/Ba) does not divide over Aa. Then, tp(ab/B) does not divide over A.

EXERCISE 5. Let Δ be as above. Show that there is $\psi_\Delta(x, y_0, \ldots, y_n, z, z_0, \ldots, z_{2n})$ such that

- if $|A| \geq 2$, each Δ-formula over A is equivalent to some $\psi_\Delta(x, \overline{a})$ for $\overline{a}$ a tuple from A;
- any consistent formula of the form $\psi_\Delta(x, \overline{a})$ for $\overline{a}$ a tuple from A is equivalent to a Δ-formula over A;
- if all formulas in Δ are stable, then so is ψ_Δ.