# QFT II (Kreimer, Summer 2014)

**Exercise I** (May 05 2014, to be handed in May 19 2014)

Assign weight $w(v) = +1$ to 3-valent vertices, weight $w(v) = 0$ to 4-valent vertices and weight $w(e) = -2$ to internal edges.

For $|\gamma|$ the loop-number of a graph $\gamma$, set

$$\omega(\gamma) = 4|\gamma| + \sum_{e \in E} w(e) + \sum_{v \in V} w(v),$$

where $E$ is the set of internal edges and $V$ the set of vertices of $\gamma$.

For $\gamma = \cup_i \gamma_i$ a disjoint union of graphs, let $\omega(\gamma) = \sum_i \omega(\gamma_i)$.

For a forest of graphs with disjoint components $f = \cup_i \gamma_i$, $\omega(f)$ is hence defined.

Find all forests $f$, co-forests $\gamma/f$, and determine $\omega(f)$ and $\omega(\gamma/f)$ for the following graph with three external edges: