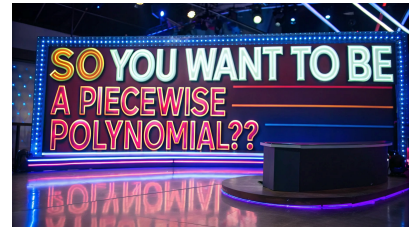
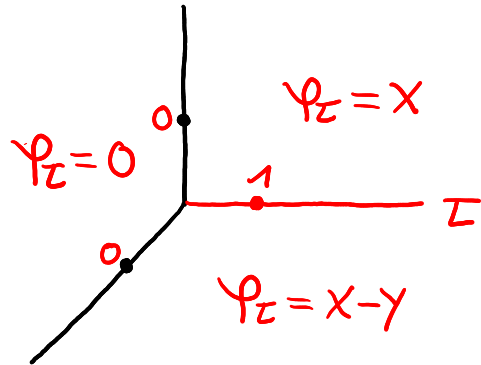
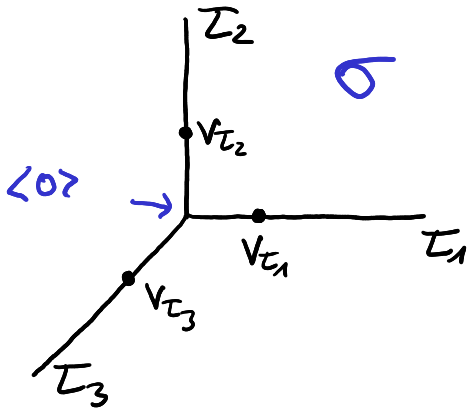


Exercise sheet - Piecewise polynomials



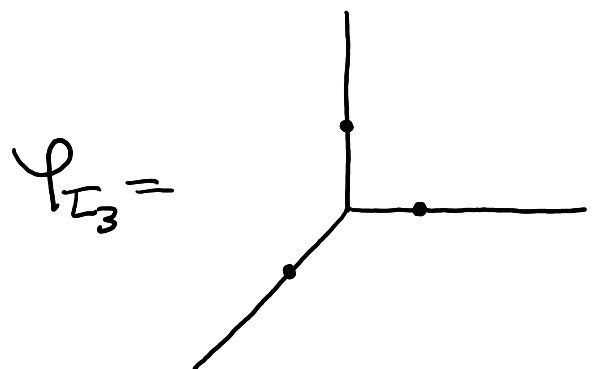
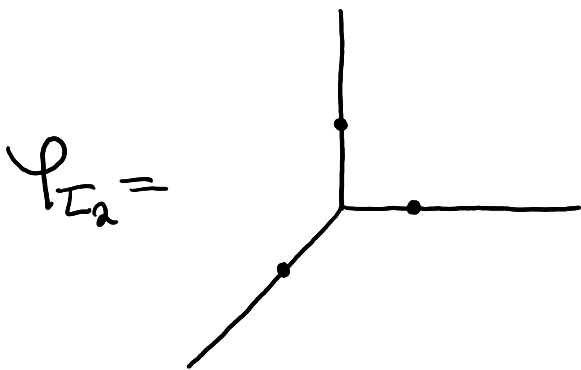
Exercise Calculate $\varphi_{\tau_2}, \varphi_{\tau_3}$ below.



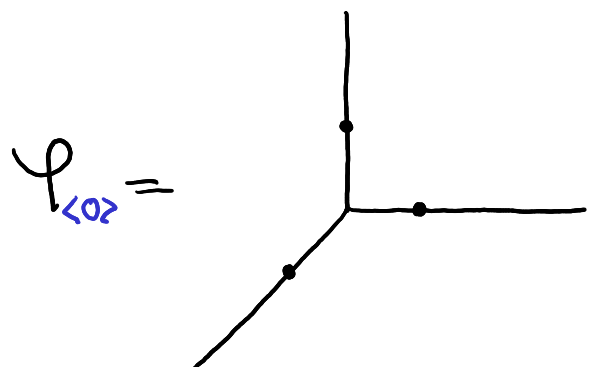
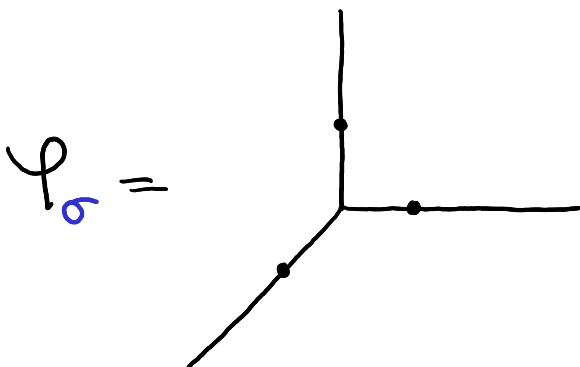
$\forall \tau_0 \exists! \varphi_{\tau_0} \in SPP^1(\Sigma)$

with

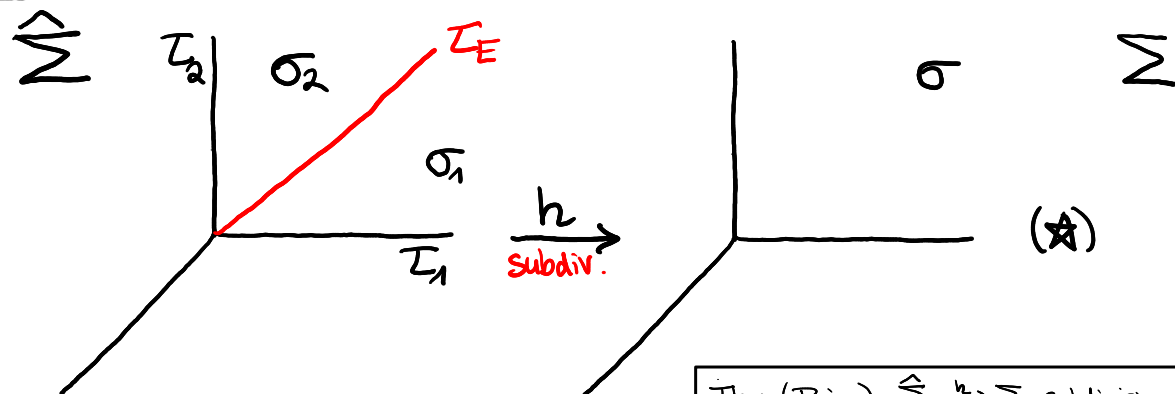
$$\varphi_{\tau_0}(v_{\tau}) = \begin{cases} 1 & , \tau = \tau_0 \\ 0 & , \tau \neq \tau_0 \end{cases}$$



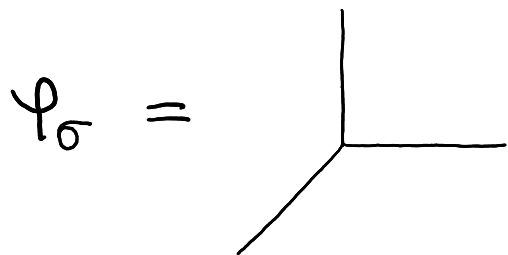
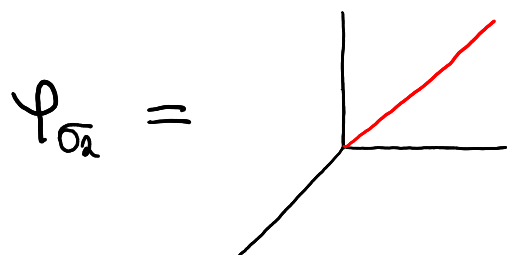
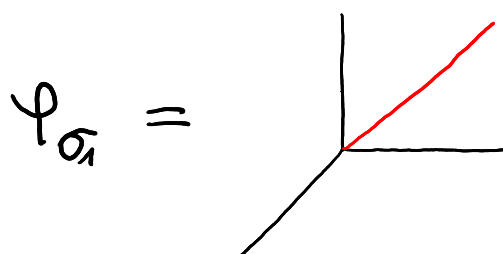
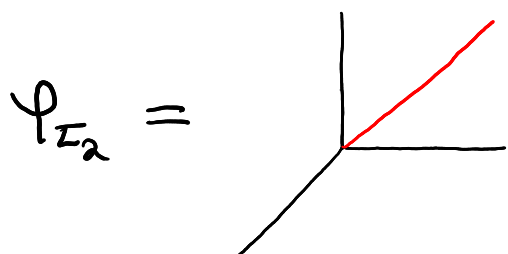
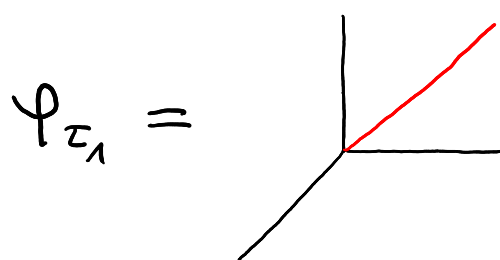
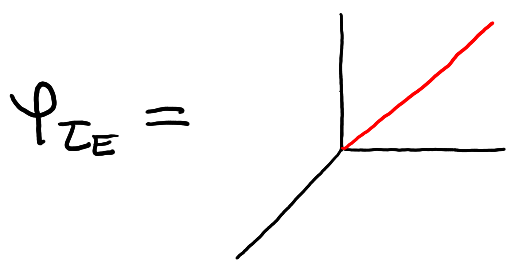
Exercise Calculate φ_{σ} for the following examples.



Exercise For subdiv. (\star), calculate $h_*(\varphi_{\mathbb{Z}_E}^2) \in SPP^2(\Sigma)$.



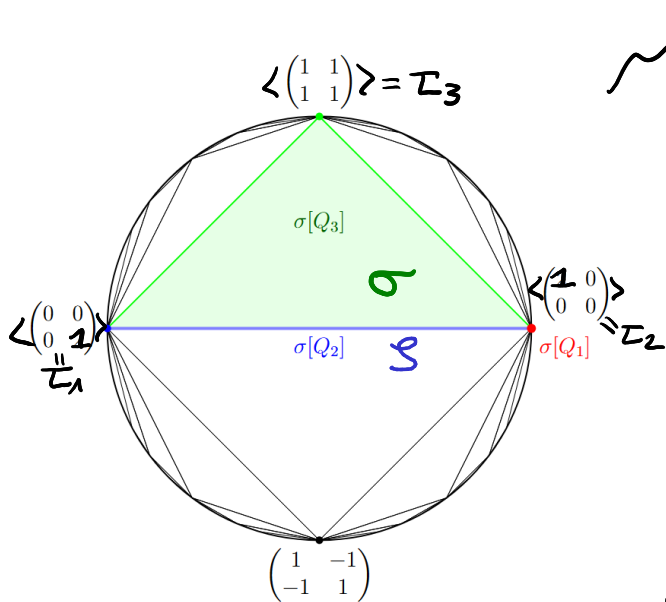
Thm (Brion) $\hat{\Sigma} \xrightarrow{h} \Sigma$ subdivision of simplicial fans
 $f \in SPP^*(\hat{\Sigma}) \Rightarrow \exists g = h_* f \in SPP^*(\Sigma)$ s.t.
 $g|_{\sigma} = \varphi_{\sigma} \cdot \sum_{\substack{\hat{\sigma} \in h^{-1}(\sigma) \\ \dim(\hat{\sigma}) = \dim(\sigma)}} \left(\frac{1}{|\varphi_{\hat{\sigma}}|} \right) \cdot f|_{\hat{\sigma}} \in \mathbb{Q}[x_1, \dots, x_n]$
 $\forall \sigma \in \Sigma(n)$



$h_*(\varphi_{\mathbb{Z}_E}^2)|_{\sigma} =$

Exa Σ_2^{pc} for $g=2$

coordinates: $Q = \begin{pmatrix} a & b \\ b & c \end{pmatrix}$



Exercise
What is

$\varphi_S|_\sigma \in \mathbb{Q}[a,b,c]$?

Can use

$\tau \rightleftharpoons S \rightleftharpoons \sigma$ in Σ_2^{pc}

Given $\sigma \in \Sigma$:

$$\varphi_{\sigma}|_\sigma := \frac{1}{|\text{Aut}(\sigma)|} \cdot \sum_{\substack{i: \sigma_i \rightarrow \sigma \\ \text{face inclusions} \\ \text{in } \Sigma}} \varphi_{\tau(\sigma_i) \leq \sigma} = \prod_{\tau \in \text{ord}(\sigma)} X_{\tau(\tau)}$$

$$\varphi_{\tau_1}|_\sigma = //$$

$$\varphi_{\tau_2}|_\sigma = //$$

$$\varphi_{\tau_3}|_\sigma = //$$

$$\varphi_S|_\sigma = //$$