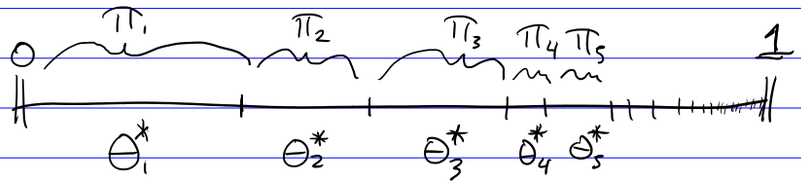
Stick Breaking Construction

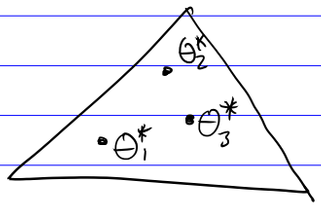
- Consider a generative story
- For k in $1 \ldots \infty$:

$$\beta_k \sim \text{Beta}(1, \alpha)$$
$$\pi_k = \beta_k \prod_{\ell=1}^{k-1} (1 - \beta_\ell)$$
$$\theta_k^* \sim H$$

- $G = \sum_{k=1}^{\infty} \pi_k \delta_{\theta_k^*}$ ← dist. which places all its mass on θ_k^*



Ex: Suppose H is a 3D Dirichlet s.t. $\theta_k^* \sim H$ fall on the 2-simplex



$\Rightarrow$ G consists of discrete states w/ non-zero prob.

DPMM (stick-breaking)

For k in $1 \ldots \infty$:

$$\beta_k \sim \text{Beta}(1, \alpha)$$
$$\pi_k = \beta_k \prod_{\ell=1}^{k-1} (1 - \beta_\ell)$$
$$\theta_k^* \sim H$$

For $i = 1 \ldots n$:

$$z_i \sim \text{"Multinomial"}(\vec{\pi})$$
$$x_i \sim p(x_i \mid \theta_{z_i}^*)$$

DPMM

$$G \sim DP(\alpha, H)$$

for $i = 1 \ldots n$:

$$\theta_i \sim G$$
$$x_i \sim p(x_i \mid \theta_i)$$