

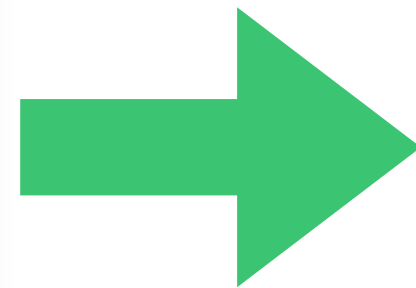
**1. Contour deformation:**  
used if multi-scale integral

**2.  $\Lambda$ -glob:**  
optimization of  $\lambda_j$  parameters

$$\int_0^1 \prod_{j=1}^N dy_j \mathcal{I}(\vec{y})$$

$y_j \in \mathbb{R}$

**Analytic  
continuation**

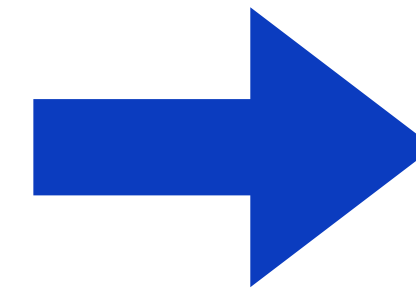


$$z_j = y_j - i\tau_j$$

$$\int_{\gamma} \prod_{j=1}^N dz_j \mathcal{I}(\vec{z})$$

$z_j \in \mathbb{C}$

$$\lambda_j = \lambda_{\text{opt}}$$



$$\tau_j = \lambda_j y_j (1 - y_j) \frac{\partial F}{\partial y_j}$$

$$\int_0^1 \prod_{j=1}^N dy_j \det\left(\frac{\partial \vec{z}(\vec{y})}{\partial \vec{y}}\right) \mathcal{I}(\vec{z}(\vec{y}))$$

$y_j \in \mathbb{R}$

**3. Normalizing flow:**  
remapping of reals

$$z_j = y_j(x) \quad \begin{matrix} \lambda_j = 0 \\ \tau_j = 0 \end{matrix}$$

$$y_j \equiv y_j(x)$$

$$\int_0^1 \prod_{j=1}^N dx_j \det\left(\frac{\partial \vec{y}(\vec{x})}{\partial \vec{x}}\right) \mathcal{I}(\vec{y}(\vec{x}))$$

$x_j \in \mathbb{R}$

$$\int_0^1 \prod_{j=1}^N dx_j \det\left(\frac{\partial \vec{z}(\vec{y})}{\partial \vec{y}}\right) \det\left(\frac{\partial \vec{y}(\vec{x})}{\partial \vec{x}}\right) \mathcal{I}(\vec{z}(\vec{y}(\vec{x})))$$

$x_j \in \mathbb{R}$