

**Definition 0.0.1** (Ito process). An  $\mathcal{F}$ -adapted continuous process  $X$  is called an Ito process if it admits a representation

$$X_t = X_0 + \int_0^t \alpha_u du + \int_0^t \beta_u \cdot dW_u, \quad \text{for all } t \in [0, T]$$

for some  $\mathcal{F}$ -adapted processes  $\alpha$  and  $\beta$  that are defined on  $(\Omega, \mathcal{F}, \mathbb{P})$  and satisfy suitable integrability conditions. It is customary to write the integral formula above using differential notation as

$$dX_t = \alpha_t dt + \beta_t \cdot dW_t.$$