In this first part we focus on the simplest—but most demonstrative—case of a single (scalar) underlying process. We lay the foundations of the ACE methodology. In particular, we establish the Zero Drift Condition and its variants, and walk through the first order computations (the first layer).

We then extend the methodology in several directions. For instance, by establishing the ACE algorithm for arbitrary orders, migrating the results to other implied measures of price than Lognormal volatility, or introducing a multi-dimensional framework.

Throughout, we illustrate the results with examples, such as local volatility models, the case of basket underlyings or the computation of two further layers.

Finally, we demonstrate the practical capabilities of the approach by approximating the implied volatility surface generated by the SABR model.