2.1 Calculate forward price of European call option

The purpose of this function is to calculate forward price of a call option whose basic formula is:

And this function accepts vector input.

Steps of implementation are as follows:

1. Input variable check.
2. Calculate and save intermediate variable
3. Calculate
4. Calculate option price based on different input T and vector Ks variable:
5. T time to expiry is zero, the forward price of the call is max(forward spot – strike price,0)
6. K strike price is zero, the price is obtained as

1. T≠0 and K≠0, implement the normal Black formula

2.4 Calculate strike price from given volatility mark.

The purpose of this function is to calculate option strike price given implied volatility an delta using inverse Black formula. And it uses zeroin algorithm, which combines bisection, secant and inverse quadratic interpolation methods, as root search method to improve robustness and speed.

Steps of implementation are as follows:

1. Input variable check.
2. Generate the target equation on variable K:
3. Use zeroin algorithm to search root and set [fwd\*0.01, fwd\*100] as initial search range for K. The outline of the algorithm is as follows:
4. Set initial value as a and b and ensure f(a) and f(b) have opposite sigs.
5. Use a secant step to calculate c between a and b
6. Repeat following steps until |b-a|<ε|b| or f(b)=0
7. Arrange a, b and c so that

* f(a) and f(b) have opposite signs
* |f(b)| ≤ |f(a)|
* c is the precious value of b

1. If c≠a, consider IQI step
2. If c=a, consider secant step
3. If the IQI or secant step is in the interval [a,b], take it, else use bisection