

Second derivative using the abbreviated central differentiation method.

Calculates the second derivative of f using the backwards differentiation numerical method.

By using $f''(x) \approx \frac{f(x+h) - 2f(x) + f(x-h)}{h^2}$, we calculate an approximation to the second derivative of f , where

the error of said method is $O(h^2)$. The difference between this and the standard is the presence of less terms of the Taylor's series' expansion, which creates a bigger error.

Parameters

1. df → The symbolical function's first derivative to calculate its second derivative.
2. h → The absolute value of the difference between $f(x+2h)$ and $f(x+h)$ or $f(x-h)$ and $f(x-2h)$.
3. x → The point where the derivative will be calculated.
4. ddf → The symbolical second derivative to calculate the error of the method.

Returns

1. $ddfa$ → The value of the derivative calculated using the numerical method in p .
2. h → The absolute value of the difference between $f(x+2h)$ and $f(x+h)$ or $f(x-h)$ and $f(x-2h)$.
3. $error$ → The absolute error between the numerical method and the actual derivative.

```
function [ddfa, h, error] = abbreviatedCentralSecondDerivative(df, ddf, x, h)
    format longE
    ddfa = (df(x+h) - 2*df(x) + df(x-h))/(h*h);
    error = abs(ddf - ddfa);
end
```