Using Taylor’s theorem:

which approximates using its derivatives at point . Replacing with to obtain a forward approximation, and with , gives:

Which simplifies to:

Similarly, using :

The negative h gives negative odd powers and positive even powers

For small h we can ommit terms of order 3 and hence we replace it with

Subtracting equation (2) from equation (1) and rearranging to make the subject:

The LHS is the exact solution of , which is approximated by , with a trunctation error of .Hence order of error 2 , .

b)

Considering forward and backward approximation again.

Adding equation (1) and equation (2) and then making the subject of the equation:

The LHS is the exact solution of , which is approximated by , with a truncation error of Hence order of error 2 , .