

Assignment 4, due Friday, 29th October

Theoretical:

1. Derive the 3-step Adams-Bashforth method:

$$w_{n+3} = w_{n+2} + h \left[\frac{23}{12}f(t_{n+2}, w_{n+2}) - \frac{4}{3}f(t_{n+1}, w_{n+1}) + \frac{5}{12}f(t_n, w_n) \right].$$

2. Determine the order of the three-step method,

$$w_{n+3} - w_n = h \left[\frac{3}{8}f(t_{n+3}, w_{n+3}) + \frac{9}{8}f(t_{n+2}, w_{n+2}) + \frac{9}{8}f(t_{n+1}, w_{n+1}) + \frac{3}{8}f(t_n, w_n) \right],$$

the *three-eighths* scheme. Is it convergent?

3. Prove that the backward differentiation formula (BDF) for $s = 3$,

$$w_{n+3} - \frac{18}{11}w_{n+2} + \frac{9}{11}w_{n+1} - \frac{2}{11}w_n = \frac{6}{11}f(t_{n+3}, w_{n+3}),$$

is convergent.

4. Find the explicit form of the BDF for $s = 4$.

Computational:

No computation this week!