

Numerical Analysis II

Homework 6

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1. Derive the first-order (one-step) Adams-Moulton formula and verify that it is equivalent to the trapezoid rule.
 2. Use the method of undetermined coefficients to derive the fourth-order Adams-Bashforth formula

$$x_{n+1} = x_n + \frac{h}{24} [55f_n - 59f_{n-1} + 37f_{n-2} - 9f_{n-3}]$$

3. (a) Use the method of undetermined coefficients to derive a multistep formula of the form

$$x_{n+1} = x_n + h [Af_{n+1} + Bf_n + Cf_{n-1}].$$

- (b) Repeat part (a) for

$$x_{n+1} = x_n + h [Af_n + Bf_{n-1} + Cf_{n-2}].$$

4. Give bases consisting of real sequences for each solution space.
 - (a) $(4E^0 - 3E^2 + E^3) x = 0$
 - (b) $(3E^0 - 2E + E^2) x = 0$
 - (c) $(2E^6 - 9E^5 + 12E^4 - 4E^3) x = 0$
 - (d) $(\pi E^2 - \sqrt{2}E + \log 2 \cdot E^0) x = 0$

5. Determine whether the difference equation

$$x_n = x_{n-1} + x_{n-2}$$

is stable.
