Section 5.10

Theorem 5.20, (i): Suppose the initial-value problem

Is approximated by a one-step difference method in the form

Suppose also that a number exists and that ) is continuous and satisfies a Lipschitz in the variable w with Lipschitz constant . Then the method is stable.

Problem 1.

To prove Theorem 5.20, part (i), show that the hypotheses imply that there exists a constant such that

Whenever and satisfy the difference equation .

Using the Lipschitz condition:

Using induction:

Letting

Problem 2

For the Adams-Bashforth and Adams-Moulton methods of order four,

1. Show that is , then
2. Show that id satisfies a Lipshitz condition with constant , then a constant exists with

347 – 2,5

Section 5.11

354- 1b, 11, 13