Homework 4

1)

a)

The approximate solution is fairly accurate, the error stays constant slightly below 0.5

b)

The approximate solution is accurate, it has a consistently 0 or near 0 error.

2)

|  |  |  |
| --- | --- | --- |
| K+1 | 1 | ½ |
| K | -1 | ½ |

a)

this method is implicit as can be seen by the dependence on derivative function in K+1

b)

3)

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| K+1 | 1 |  |
| K | -1 | 23/12 |
| K-1 |  | -16/12 |
| K-2 |  | 5/12 |

This scheme is explicit as can be seen by the lack of needed variable in K+1

4)

Calculating the tables once since they are the same for each scheme

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Thus the scheme is 2nd order.

5)

Once again, scheme is order 2

6)

Set set

Convergent:

7)

a)

Order 3

b)

setting

With the Anzats

Or that the only root is , a strongly stable solution.

Since the order is greater than or equal to 1 and the roots are such that , the Adams-Bashforth 3 step method converges.

8)

It is of at least order 1 so the first condition for convergence is satisfied

Anzats:

It can be shown that every one of these polynomials have a root thus

Which has roots

But and thus the scheme does not satisfy the second condition and is thus unstable.