

Math 352 Quiz2

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The Heun Method

The generic formula of Heun is

$$\tilde{u}_{i+1} = u_i + \Delta t f(t_i, u_i)$$

$$u_{i+1} = u_i + \frac{\Delta t}{2} (f(t_i, u_i) + f(t_{i+1}, \tilde{u}_{i+1}))$$

where \tilde{u}_{i+1} is the “predictor” and u_{i+1} is the “corrector”.

The first step is the prediction part: it gives a reasonable approximation based the Explicit Euler Method. The second step corrects the initial approximation with the Crank-Nicolson Method.

Properties

- The method is explicit
- The method has second-order accuracy; i.e. the error is proportional to $(\Delta t)^2$.
- The method is “conditionally stable”.