Assignment 5

The due date for submitting this assignment has passed.

1. Which among the following schemes is inconsistent while solving a 1D parabolic equation?
   - Crank-Nicolson Method
   - Leapfrog Method
   - Gauss-Seidel Method
   - None, the answer is incorrect.
   
   Accepted Answers:
   - None, the answer is incorrect.

2. The maximum step size that can be used to obtain a stable solution for a 1D unsteady heat conduction equation using FTCS method for 
   \[ \Delta t = \frac{1}{10} \Delta x^2 \] 
   and 
   \[ \Delta x = 13 \text{mm} \] 
   is
   - 16 s
   - 36 s
   - 90 s
   - 48 s

   Accepted Answers:
   - None, the answer is incorrect.

3. The number of initial conditions required to solve a 1D parabolic equation using Richardson method is
   - 1
   - 2
   - 3
   - 4

   Accepted Answers:
   - None, the answer is incorrect.

4. The discretized form of the equation 
   \[ \frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 0 \] 
   using Crank-Nicolson scheme for point 10 is 
   \[ \frac{\Delta t}{2} \left( \frac{u_{i+1}^{n+1} - u_i^{n+1}}{\Delta x} + \frac{u_i^{n+1} - u_{i-1}^{n+1}}{\Delta x} \right) = 0 \] 
   The value of \( \Delta t \) for which the transverse error reduces to \( 0 \) is
   - 0 s
   - 1 s
   - 10 s
   - None, the answer is incorrect.

   Accepted Answers:
   - None, the answer is incorrect.

5. The equation 
   \[ \frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 0 \] 
   has a transverse error of 
   \[ \left| u(x_1, t_1) - u(x_2, t_1) \right| \] 
   The value of \( \Delta t \) for which the transverse error reduces to \( 0 \) is
   - 0 s
   - 1 s
   - 10 s

   Accepted Answers:
   - None, the answer is incorrect.

6. The discretized form of the equation 
   \[ \frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 0 \] 
   using the scheme for point 11 is 
   \[ \frac{\Delta t}{2} \left( \frac{u_{i+1}^{n+1} - u_i^{n+1}}{\Delta x} + \frac{u_i^{n+1} - u_{i-1}^{n+1}}{\Delta x} \right) = 0 \] 
   The value of \( \Delta t \) for which the transverse error reduces to \( 0 \) is
   - 0 s
   - 1 s
   - 10 s

   Accepted Answers:
   - None, the answer is incorrect.

7. The discretized form of the equation 
   \[ \frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 0 \] 
   using Crank-Nicolson scheme for point 12 is 
   \[ \frac{\Delta t}{2} \left( \frac{u_{i+1}^{n+1} - u_i^{n+1}}{\Delta x} + \frac{u_i^{n+1} - u_{i-1}^{n+1}}{\Delta x} \right) = 0 \] 
   The value of \( \Delta t \) for which the transverse error reduces to \( 0 \) is
   - 0 s
   - 1 s
   - 10 s

   Accepted Answers:
   - None, the answer is incorrect.

8. The discretized form of the equation 
   \[ \frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 0 \] 
   using the scheme for point 13 is 
   \[ \frac{\Delta t}{2} \left( \frac{u_{i+1}^{n+1} - u_i^{n+1}}{\Delta x} + \frac{u_i^{n+1} - u_{i-1}^{n+1}}{\Delta x} \right) = 0 \] 
   The value of \( \Delta t \) for which the transverse error reduces to \( 0 \) is
   - 0 s
   - 1 s
   - 10 s

   Accepted Answers:
   - None, the answer is incorrect.

9. The discretized form of the equation 
   \[ \frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 0 \] 
   using Crank-Nicolson scheme for point 14 is 
   \[ \frac{\Delta t}{2} \left( \frac{u_{i+1}^{n+1} - u_i^{n+1}}{\Delta x} + \frac{u_i^{n+1} - u_{i-1}^{n+1}}{\Delta x} \right) = 0 \] 
   The value of \( \Delta t \) for which the transverse error reduces to \( 0 \) is
   - 0 s
   - 1 s
   - 10 s

   Accepted Answers:
   - None, the answer is incorrect.

10. The discretized form of the equation 
    \[ \frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 0 \] 
    using the scheme for point 15 is 
    \[ \frac{\Delta t}{2} \left( \frac{u_{i+1}^{n+1} - u_i^{n+1}}{\Delta x} + \frac{u_i^{n+1} - u_{i-1}^{n+1}}{\Delta x} \right) = 0 \] 
    The value of \( \Delta t \) for which the transverse error reduces to \( 0 \) is
    - 0 s
    - 1 s
    - 10 s

    Accepted Answers:
    - None, the answer is incorrect.

Due on 2020-03-04, 23:59 CET.