Assignment 02

The due date for submitting this assignment has passed. Any extensions you have been granted must be applied.

1. The roots of the second order partial differential equation \( \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \) are:
   - circular
   - elliptic
   - hyperbolic
   - parabolic

   No. the answer is incorrect. 
   Accepted Answers: None.

2. The lines along which a partial differential equation reduces to an ordinary differential equation are called:
   - characteristic lines
   - transition lines
   - parabolic lines
   - hyperbolic lines

   No. the answer is incorrect. 
   Accepted Answers: None.

3. The steady compressible flow defined by \( \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \) becomes hyperbolic under the condition:

   - \( M_a = 0 \)
   - \( M_a = 1 \)
   - \( M_a > 1 \)
   - \( M_a < 1 \)

   No. the answer is incorrect. 
   Accepted Answers: None.

4. The value of \( a \) for which the equation \( \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \) becomes parabolic is:
   - \( a = 0 \)
   - \( a = 1 \)
   - \( a = 2 \)
   - None of the above

   No. the answer is incorrect. 
   Accepted Answers: None.

5. Which of these apply to hyperbolic equations?
   - They have real characteristic lines.
   - They have two real characteristic lines.
   - They have two imaginary characteristic lines.
   - They do not have characteristic lines.

   No. the answer is incorrect. 
   Accepted Answers: None.

6. Which of these terms are required to solve a hyperbolic equation?
   - initial condition
   - boundary condition
   - both initial and boundary conditions
   - neither initial nor boundary conditions

   No. the answer is incorrect. 
   Accepted Answers: None.

7. The nature of the following system of partial differential equations is (these set of equations represent the shallow water equations):

   \[ \frac{\partial h}{\partial t} + \frac{\partial (hu)}{\partial x} = 0 \]
   \[ \frac{\partial u}{\partial t} + \frac{\partial (hu)}{\partial x} = 0 \]

   - elliptic
   - parabolic
   - hyperbolic
   - none of the above

   No. the answer is incorrect. 
   Accepted Answers: None.

8. Which of the characteristic apply to parabolic equations?
   - finite domain of dependence and infinite domain of influence
   - no domain of dependence and no domain of influence
   - finite domain of dependence and finite domain of influence
   - none of the above

   No. the answer is incorrect. 
   Accepted Answers: None.

9. The following system of equations are classified as:

   \[ \frac{\partial u}{\partial t} + \frac{\partial (hu)}{\partial x} = 0 \]
   \[ \frac{\partial h}{\partial t} + \frac{\partial (hu)}{\partial x} = 0 \]

   - elliptic
   - parabolic
   - hyperbolic
   - none of the above

   No. the answer is incorrect. 
   Accepted Answers: None.

10. Which of these ODEs are used to classify the following second order PDE?

    \[ \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \]

    - elliptic
    - parabolic
    - hyperbolic
    - none of the above

    No. the answer is incorrect. 
    Accepted Answers: None.