Lecture 15 Activity Results for Test Student

Score for this attempt: 1 out of 1
Submitted Feb 27 at 10:29am
This attempt took 2 minutes.

Question 1

1 / 1 pts

Consider the first order PDE $2u_t + 3u_x = 5u + 7$.

Which one below a characteristic line?

- $x(\tau) = -3\tau + x_0, \ t(\tau) = 2\tau + t_0$
- $x(\tau) = 2\tau + x_0, \ t(\tau) = 3\tau + t_0$

Correct!

- ☒ $\mathbf{x(\tau) = 3\tau + x_0, \ t(\tau) = 2\tau + t_0}$
- $x(\tau) = -2\tau + x_0, \ t(\tau) = 3\tau + t_0$
- $x(\tau) = x_0, \ t(\tau) = 2\tau + t_0$

Additional Comments:

Question 2

0 / 0 pts

Which of the following is correct? **Select all that apply.**

- A quasi-linear PDE is a semi-linear PDE.
- A semi-linear PDE is a linear PDE.

Correct!

- ☒ A semi-linear PDE is a quasi-linear PDE.

Correct!

- ☒ A linear PDE is a semi-linear PDE.
- A quasi-linear PDE is a linear PDE.

Additional Comments:

Question 3

0 / 0 pts

Consider the first order PDE $2u_t + 3u_x = 5u + 7$.

Along a characteristic line $\big(x(\tau), t(\tau)\big)$, let $v(\tau) \equiv u\big(x(\tau), t(\tau)\big)$. Which statement below is true?

- $\frac{dv(\tau)}{d\tau} = 0$
- $\frac{dv(\tau)}{d\tau} = 5v(\tau)$

Correct!

- ☒ $\mathbf{\frac{dv(\tau)}{d\tau} = 5v(\tau) + 7}$
- $\frac{dv(\tau)}{d\tau} = -\big(5v(\tau) + 7\big)$

There is not sufficient information for evolving $v(\tau)$ along the characteristic line.

Additional Comments:

Question 4

0 / 0 pts

Consider the first order PDE $2u_t + 3u_x = 5u + 7$.

Suppose the value of u is imposed along curve C.

Which of the following gives an ill-posed problem? **Select all that apply.**

- Curve C is parameterized by $x_0(s) = s, \ t_0(s) = 0$.
- Curve C is parameterized by $x_0(s) = s, \ t_0(s) = s$.

Correct!

- ☒ Curve C is parameterized by $\mathbf{x_0(s) = s, \ t_0(s) = \frac{2}{3}s}$.

Correct!

- ☒ Curve C is parameterized by $\mathbf{x_0(s) = s, \ t_0(s) = \sin(s)}$.
- Curve C is parameterized by $x_0(s) = s, \ t_0(s) = \frac{1}{2}\sin(s)$.

Additional Comments:

Question 5

0 / 0 pts

Consider the first order PDE $u_t = 2u_x = -3u$.

Suppose the value of u is imposed at $t = 0$ along the positive x-axis.

Which of the following gives a well-posed problem for solving u in the first quadrant of the x-t plane? **Select all that apply.**

- condition $u(0, t) = 0, \ t \geq 0$.
- condition $u(0, t) = \cos(t), \ t \geq 0$.
- condition $u(10, t) = \cos(t), \ t \geq 0$.

Correct!

- ☒ no additional condition imposed.
- condition $u(0, t) = \frac{1}{1 + e^{-t}}, \ t \geq 0$.
- condition $u(0, t) = \cos(t), \ t \geq 10$.

Additional Comments:

Question 6

0 / 0 pts

Consider the first order PDE $u_t + 2u_x = -3u$.

Suppose the value of u is imposed at $t = 0$ along the positive x-axis.

Which of the following gives a well-posed problem for solving u in the first quadrant of the x-t plane? **Select all that apply.**

Correct!

- ☒ condition $\mathbf{u(0, t) = 0, \ t \geq 0}$.

Correct!

- ☒ condition $\mathbf{u(0, t) = \cos(t), \ t \geq 0}$.
- condition $u(10, t) = \cos(t), \ t \geq 0$.
- no additional condition imposed.

Correct!

- ☒ condition $\mathbf{u(0, t) = \frac{1}{1 + e^{-t}}, \ t \geq 0}$
- condition $u(0, t) = \cos(t), \ t \geq 10$.

Additional Comments:

Question 7

0 / 0 pts

Consider the first order PDE $u_t - xu_x = -3u$.

Which statement below is true regarding the characteristics.

- The characteristics are a family of parallel straight lines.
- The characteristics are a family of straight lines, converging as t increases.
- The characteristics are a family of straight lines, diverging as t increases.

Correct!

- ☒ The characteristics are a family of curves, converging as t increases.
- The characteristics are a family of curves, diverging as t increases.

Additional Comments:

Question 8

0 / 0 pts

Consider the first order PDE $u_t + xu_x = -3u$.

Which statement below is true regarding the characteristics.

- The characteristics are a family of parallel straight lines.
- The characteristics are a family of straight lines, converging as t increases.
- The characteristics are a family of straight lines, diverging as t increases.
- The characteristics are a family of curves, converging as t increases.

Correct!

- ☒ The characteristics are a family of curves, diverging as t increases.

Additional Comments:

Fudge Points: –

You can manually adjust the score by adding positive or negative points to this box.

Final Score: 1 out of 1

Update Scores

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Quiz Submissions

Attempt 1: 1

Test Student has 1 attempt left

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