Lecture 18 Activity Results for Test Student

Score for this attempt: **1** out of 1
Submitted Mar 7 at 5:04pm
This attempt took 1 minute.

Question 1

1 / 1 pts

Consider the conservation law $u_t + u_x = 0$.

Note: this is a linear conservation law with $F(u) \equiv u$.

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

- $u(x,t) = \begin{cases} -1, & x < 0 \\ +1, & x > 0 \end{cases}$ is a weak solution of $u_t + u_x = 0$.
- Correct! $u(x,t) = \begin{cases} -2, & x < t \\ +1, & x > t \end{cases}$ is a weak solution of $u_t + u_x = 0$.
- $u(x,t) = \begin{cases} -\cos(x), & x < 0 \\ +\cos(x), & x > 0 \end{cases}$ is a weak solution of $u_t + u_x = 0$.
- $u(x,t) = \begin{cases} -\cos(x), & x < t \\ +\cos(x), & x > t \end{cases}$ is a weak solution of $u_t + u_x = 0$.
- Correct! $u(x,t) = \begin{cases} -3\cos(x-t), & x < t \\ +\cos(x-t), & x > t \end{cases}$ is a weak solution of $u_t + u_x = 0$.
- $u(x,t) = \begin{cases} -3\cos(x-t), & x < 0 \\ +\cos(x-t), & x > 0 \end{cases}$ is a weak solution of $u_t + u_x = 0$.

Additional Comments:

Question 2

0 / 0 pts

Consider the IVP of conservation law $\begin{cases} u_t + (u^2)_x = 0 \\ u(x,0) = \begin{cases} +3, & x < 0 \\ 0, & x > 0 \end{cases} \end{cases}$.

Which statement below is true?

- $u(x,t) = \begin{cases} +3, & x < 0 \\ 0, & x > 0 \end{cases}$ is a weak solution of the IVP.
- $u(x,t) = \begin{cases} +3, & x < t \\ 0, & x > t \end{cases}$ is a weak solution of the IVP.
- $u(x,t) = \begin{cases} +3, & x < 2t \\ 0, & x > 2t \end{cases}$ is a weak solution of the IVP.
- Correct! $u(x,t) = \begin{cases} +3, & x < 3t \\ 0, & x > 3t \end{cases}$ is a weak solution of the IVP.
- $u(x,t) = \begin{cases} +3, & x < 3t/2 \\ 0, & x > 3t/2 \end{cases}$ is a weak solution of the IVP.
- $u(x,t) = \begin{cases} +3, & x < 6t \\ 0, & x > 6t \end{cases}$ is a weak solution of the IVP.

Additional Comments:

Question 3

0 / 0 pts

Consider the IVP of conservation law $\begin{cases} u_t + (u^2)_x = 0 \\ u(x,0) = \begin{cases} +3, & x < 0 \\ -1, & x > 0 \end{cases} \end{cases}$.

Which statement below is true?

- $u(x,t) = \begin{cases} +3, & x < 0 \\ -1, & x > 0 \end{cases}$ is a weak solution of the IVP.
- $u(x,t) = \begin{cases} +3, & x < t \\ -1, & x > t \end{cases}$ is a weak solution of the IVP.
- Correct! $u(x,t) = \begin{cases} +3, & x < 2t \\ -1, & x > 2t \end{cases}$ is a weak solution of the IVP.
- $u(x,t) = \begin{cases} +3, & x < 3t \\ -1, & x > 3t \end{cases}$ is a weak solution of the IVP.
- $u(x,t) = \begin{cases} +3, & x < 4t \\ -1, & x > 4t \end{cases}$ is a weak solution of the IVP.
- $u(x,t) = \begin{cases} +3, & x < -2t \\ -1, & x > -2t \end{cases}$ is a weak solution of the IVP.

Additional Comments:

Question 4

0 / 0 pts

Consider the IVP of conservation law $\begin{cases} u_t + (\frac{1}{2}u^2)_x = 0 \\ u(x,0) = \begin{cases} -2, & x < 0 \\ +1, & x > 0 \end{cases} \end{cases}$.

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

- The physical solution of the IVP is a shock.
- Correct! A shock is a weak solution of the IVP but is not the physical solution.
- A shock cannot be a weak solution of the IVP.
- Correct! The physical solution of the IVP is a rarefaction wave.
- The IVP has no physical solution.
- A rarefaction wave cannot be a weak solution of the IVP.

Additional Comments:

Question 5

0 / 0 pts

Consider the IVP $\begin{cases} u_t + (\frac{1}{2}u^2)_x = 0 \\ u(x,0) = \begin{cases} +2, & x < 0 \\ +1, & x > 0 \end{cases} \end{cases}$.

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

- Correct! The physical solution of the IVP is a shock.
- A shock is a weak solution of the IVP but is not the physical solution.
- A shock cannot be a weak solution of the IVP.
- The physical solution of the IVP is a rarefaction wave.
- The IVP has no physical solution.
- Correct! A rarefaction wave cannot be a weak solution of the IVP.

Additional Comments:

Question 6

0 / 0 pts

Consider the IVP of conservation law $\begin{cases} u_t + uu_x = 0 \\ u(x,0) = \begin{cases} -2, & x < -2\varepsilon \\ x/\varepsilon & -2\varepsilon < x < \varepsilon \\ +1, & x > \varepsilon \end{cases} \end{cases}$.

Which statement below is correct.

- The solution is a stationary wave (i.e., $u(x,t) = u(x,0)$).
- The solution is a traveling wave propagating to the right (i.e., $u(x,t) = u(x - ct, 0)$).
- As *t* increases, the narrow transition zone in the initial condition converges to a point and the classical solution ceases to exist at a small t_c.
- Correct! As *t* increases, the narrow transition zone in the initial condition spreads out and the classical solution exists for *t* > 0.
- The solution is a traveling wave propagating to the left (i.e., $u(x,t) = u(x + ct, 0)$).

Additional Comments:

Question 7

0 / 0 pts

Consider the IVP of conservation law $\begin{cases} u_t + uu_x = 0 \\ u(x,0) = \begin{cases} +2, & x < -2\varepsilon \\ -x/\varepsilon & -2\varepsilon < x < \varepsilon \\ -1, & x > \varepsilon \end{cases} \end{cases}$.

Which statement below is correct.

- The solution is a stationary wave (i.e., $u(x,t) = u(x,0)$).
- The solution is a traveling wave propagating to the right (i.e., $u(x,t) = u(x - ct, 0)$).
- Correct! As *t* increases, the narrow transition zone in the initial condition converges to a point and the classical solution ceases to exist at a small t_c.
- As *t* increases, the narrow transition zone in the initial condition spreads out and the classical solution exists for *t* > 0.
- The solution is a traveling wave propagating to the left (i.e., $u(x,t) = u(x + ct, 0)$).

Additional Comments:

Question 8

0 / 0 pts

Traffic flow is governed by the conservation law
$u_t + \big(F(u)\big)_x = 0, \quad F(u) = v_0 u(1-u).$

where v_0 is the velocity of cars when the car density is near zero, *u* is the normalized car density, $u\rho_{\max}$ is the actual car density, and $\rho_{\max}$ is the maximum car density.

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

- v_0 is the velocity of cars for any normalized car density *u*.
- $F'(u) = v_0(1-2u)$ is the velocity of cars when the normalized car density is *u*.
- Correct! $v_0(1-u)$ is the velocity of cars when the normalized car density is *u*.
- v_0 is the velocity of characteristic propagation in the x-t plane for any normalized car density *u*.
- Correct! $F'(u) = v_0(1-2u)$ is the velocity of characteristic propagation in the x-t plane when the normalized car density is *u*.
- $v_0(1-u)$ is the velocity of characteristic propagation in the x-t plane when the normalized car density is *u*.

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

Here's the latest quiz results for Test Student. You can modify the points for any question and add more comments, then click "Update Scores" at the bottom of the page.

Quiz Submissions

Attempt 1: 1
Attempt 2: 1
Attempt 3: 1

Test Student has no attempts left

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