

# ANNOUNCEMENTS

- What's left?
  - Quiz 7 (Due Apr. 20)
  - Homework 13 (Due Apr. 20)
  - If we finish early, we finish early.

With Einstein's velocity addition rule,

$$u = \frac{u' + v}{1 + \frac{u'v}{c^2}}$$

what happens when  $v$  is very small compared to  $c$ ?

- A.  $u \rightarrow 0$
- B.  $u \rightarrow c$
- C.  $u \rightarrow \infty$
- D.  $u \approx u' + v$
- E. Something else

With Einstein's velocity addition rule,

$$u = \frac{u' + v}{1 + \frac{u'v}{c^2}}$$

what happens when  $u'$  is  $c$ ?

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- B.  $u \rightarrow c$
- C.  $u \rightarrow \infty$
- D.  $u \approx u' + v$
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I have seen the Einstein summation notation before:

$$\mathbf{a} \cdot \mathbf{b} \equiv a_{\mu} b^{\mu}$$

- A. Yes and I'm comfortable with it
- B. Yes, but I'm just a little rusty with it
- C. Yes, but I don't remember it it all
- D. Nope

**True or False:** The dot product (in 3 space) is invariant to rotations.

$$\mathbf{a} \cdot \mathbf{b} \equiv a_{\mu} b^{\mu}$$

- A. True
- B. False
- C. No idea

Displacement is a defined quantity

$$\Delta x^\mu \equiv (x_A^\mu - x_B^\mu)$$

Is the displacement a contravariant 4-vector?

- A. Yes
- B. No
- C. Umm...don't know how to tell
- D. None of these.

**Be ready to explain your answer.**

The displacement between two events  $\Delta x^\mu$  is a contravariant 4-vector.

Is  $5\Delta x^\mu$  also a 4-vector?

A. Yes

B. No



The displacement between two events  $\Delta x^\mu$  is a contravariant 4-vector.

Is  $\Delta x^\mu / \Delta t$  also a 4-vector (where  $\Delta t$  is the time between events in some frame)?

A. Yes

B. No

The displacement between two events  $\Delta x^\mu$  is a contravariant 4-vector.

Is  $\Delta x^\mu / \Delta \tau$  also a 4-vector (where  $\Delta \tau$  is the proper time)?

A. Yes

B. No