

22. (a) We use Eq. 38-28:

$$v = \frac{v' + u}{1 + uv'/c^2} = \frac{0.47c + 0.62c}{1 + (0.47)(0.62)} = 0.84c ,$$

in the direction of increasing  $x$  (since  $v > 0$ ). The classical theory predicts that  $v = 0.47c + 0.62c = 1.1c > c$ .

(b) Now  $v' = -0.47c$  so

$$v = \frac{v' + u}{1 + uv'/c^2} = \frac{-0.47c + 0.62c}{1 + (-0.47)(0.62)} = 0.21c ,$$

again in the direction of increasing  $x$ . By contrast, the classical prediction is  $v = 0.62c - 0.47c = 0.15c$ .