[lex163] Exchange of light signals II

When a spaceship (frame $\mathcal{F}'$) passes Earth (frame $\mathcal{F}$) at relative velocity $v = 0.6c$ (event 1), clocks are synchronized: $t_1 = t_1' = 0$. At time $t_2 = 10$min a light pulse is emitted from Earth toward the spaceship (event 2). At time t_3' the light pulse is detected on the spaceship (event 3).

(a) Draw a Minkowski diagram with axes (x, t) and (x', t') to scale on graph paper (with time measured in minutes and distance in light-minutes) or use a graphing software. Then locate the events 1, 2, 3 in the diagram.

(b) Determine the coordinates of all three event in both frames by graphical construction. Compare the results with those found in [lex90].

Solution: