5. The diagram below shows "synchronized" clocks in frames S and S' as viewed from the CM frame (S''). Report how long it takes clock A' to click off two seconds as seen in S. SO what is the γ factor? What is the corresponding β? Report how long it takes clock E to click off two seconds as seen in S'. As seen in S', how far apart are A and E at the time $t' = 3$? SO what is the γ factor?

   Call the distance between adjacent clocks as seen in the CM frame $\Delta x''$. Note that the clock A' travels a distance of $\Delta x''$ in a time $\Delta t' = 2$. Use this information to write down an equation for the velocity of the S' frame relative to the S'' frame (γ for the boost between S' and S'' should enter into this equation; note that these γ and β connect different frames from those found above.). Note the lack of synchronization between clocks A' and B' as seen in the CM frame: $\Delta t' = 1$ for $\Delta x''$ separation. Write down the equation describing this lack of synchronization. Solve these two equations to show that the β and γ that connect the S'' and S' frames must satisfy: $\beta^2\gamma^2 = \frac{1}{2}$. Find β. What is the time interval ($\Delta t''$) between the a) view and the b) view?

   To go from S' to S, you need to boost by this β twice: once to reach S'' and then again to reach S. Using the velocity addition formula, show that this process produces the β you found initially that connects S' and S.