Putting $\Delta t\left(1-\frac{V}{c}\right) = \Delta t_e$, the time interval between light from clocks arriving at observer's position

$$\Delta t_e = \Delta t' \sqrt{\frac{1-V/c}{1+V/c}} \quad (2)$$

If the clock is moving away from the observer with speed V then V in (2) is $-V$

so $$\Delta t_e = \Delta t' \sqrt{\frac{1+V/c}{1-V/c}} \quad (3)$$

From (2), $\Delta t_e < \Delta t'$, so a clock moving towards an observer will appear to run fast. From (3), a clock moving away from an observer will appear to run slow, since $\Delta t_e > \Delta t'$! In fact if the moving clock paused at the position of the observer and both clocks were synchronised, and the clock moved very rapidly away then towards the observer, then stopped, the elapsed time on that clock will be seen to be less than on the observers clock. From this comes the expression moving clocks run slow.

You haven't saw whether the theorem is true?

The reason for the discrepancy is the Doppler effect. When clocks are compared before and after one clocks journey, this effect disappears and we are left with only the time dilation effect. 8 (18)

3) i)

From conservation of Energy:

$E = E_1 + E_2$

From conservation of momentum