6. (a) The round-trip (discounting the time needed to "turn around") should be one year according to the clock you are carrying (this is your proper time interval Δt_0) and 1000 years according to the clocks on Earth which measure Δt. We solve Eq. 38-7 for v and then plug in:

$$\begin{aligned} v &= c\sqrt{1-\left(\frac{\Delta t_0}{\Delta t}\right)^2} \\ &= (299792458\,\mathrm{m/s})\sqrt{1-\left(\frac{1\,\mathrm{y}}{1000\,\mathrm{y}}\right)^2} \\ &= 299792308\ \mathrm{m/s} \end{aligned}$$

which may also be expressed as $v = c\sqrt{1-(1000)^{-2}} = 0.999\,999\,50c$. The discussion in Sample Problem 38-7 dealing with these sorts of values may prove helpful for those whose calculators do not yield this answer.

(b) The equations do not show a dependence on acceleration (or on the direction of the velocity vector), which suggests that a circular journey (with its constant magnitude centripetal acceleration) would give the same result (if the speed is the same) as the one described in the problem. A more careful argument can be given to support this, but it should be admitted that this is a fairly subtle question which has occasionally precipitated debates among professional physicists.