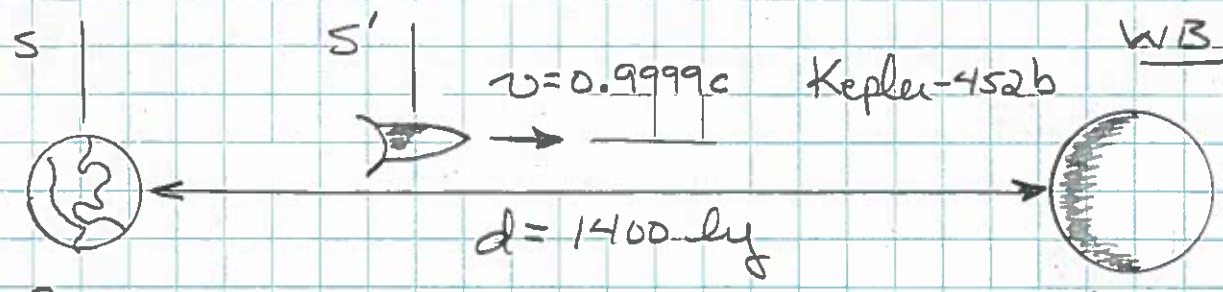

a.) for observer in S (i.e. Earth)

Trip out: $\Delta t = \frac{d}{v} = 1400.14$ y

which is the same for trip back.

Trip time = $\Delta t + 1\text{ y} + \Delta t = 2801.28$ y

∴ The year is = 2020 + 2801 = 4821 AD

b.) Passengers on the ship measure the proper time of the trip:

$$\Delta t_p = \frac{\Delta t}{\gamma}$$

where $\gamma = \frac{1}{\sqrt{1 - v^2/c^2}} = 70.71$

So, $\Delta t_p = \frac{\Delta t}{\gamma} = 19.80$ y

And, trip time = $\Delta t_p + 1 + \Delta t_p = 40.6$ y

∴ when you return, you are

60 years old