ADVANCED DYNAMICS — PHY 4241/5227
SOLUTIONS – SET 11

(39) For constant α:

$$t_2 - t_1 = \int_{\tau_1}^{\tau_2} \cosh(\alpha\tau)\, d\tau = \alpha^{-1} \left[\sinh(\alpha\tau_2) - \sinh(\alpha\tau_1)\right] .$$

With $\alpha^{-1} = c/g = 3\times10^8/9.81\,[s]$, $\tau_2 = 5\,[y]$, $\tau_1 = 0\,[y]$, $1\,[y] = 365\times24\times3600\,[s]$ one finds $t_2 - t_1 = 84.12\,[y]$. The same for the other three sections of the trip. Therefore, the year on earth is $2020 + 4 \times 84.12 = 2020 + 336.47 \to 2356$.