(41) For constant α:

$$x_2 - x_1 = c \int_{t_1}^{t_2} \beta \, dt = c \int_{\tau_1}^{\tau_2} \tanh(\zeta) \, \cosh(\zeta) \, d\tau = c \int_{\tau_1}^{\tau_2} \sinh(\zeta) \, d\tau$$

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

With $\alpha^{-1} = c/g = 3 \times 10^8/9.81 \, [s]$, $\tau_2 = 5 \, [y]$, $\tau_1 = 0 \, [y]$, $1 \, [y] = 365 \times 24 \times 3600 \, [s]$ one finds $x_2 - x_1 = 83.15$ light years. The maximum distance is then 166.3 light years.