Problems on Ch. 11: Rates of Change of Vorticity&Divergence

Q 11.1: Starting with the vorticity equation on the form

$$\left(\frac{D}{Dt}\right)\ln(\zeta_{abs})=-\operatorname{div}v_h$$

and assuming $\operatorname{div}v_h$ is constant at $-10^{-6}\,\text{s}^{-1}$, how long does it take to double the absolute vorticity?

What value of the divergence is needed to change the absolute vorticity by a factor of 2 in a day?

Q 11.2: In a tornado, windspeeds of $100\,\text{m s}^{-1}$ **in circular flow of radius 100 m are common. What is the value of the vorticity?**

Estimate how long it would take to produce such values of the vorticity if the only mechanism available is divergence of order $10^{-6}\,\text{s}^{-1}$.