Finding the force of mortality in the Weibull model

Weibull model is of form $\,_t p_x = \exp(-\alpha t^\beta)$

remember from when we derived $\,_t p_x = e^{-\int_0^t \mu_{x+s} ds}$ earlier, we had along the way:

$$\frac{d}{dt} \log \,_t p_x = -\mu_{x+t}$$

∴ with Weibull parameters here

$$\mu_{x+t} = -\frac{d}{dt} \log(\exp(-\alpha t^\beta))$$

$$= -\frac{d}{dt}(-\alpha t^\beta)$$

from Calculus recall $\quad \dfrac{d}{dy} ay^b = aby^{b-1}$

∴ in Weibull

$$\underline{\underline{\mu_{x+t} = \alpha \beta t^{\beta-1}}}$$

and we see that if $\beta = 1$ then $\mu_{x+t} = \alpha$, a constant which is the exponential model.