2.14abe*

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a)

$$\int e^{2t}\theta(t)\,dt = \begin{cases} \int e^{2t}\,dt, & t>0 \\ 0, & t<0 \end{cases} \Rightarrow$$

$$\Rightarrow \left(\int_0^t e^{2t}\,dt\right)\theta(t) = \left[\frac{e^{2t}}{2}\right]_0^t \theta(t) =$$

$$= \underline{\underline{\frac{e^{2t}-1}{2}\cdot\theta(t)}}$$

b)

$$\int (t-1)\theta(t)\,dt = \begin{cases} \int t-1\,dt, & t>0 \\ 0, & t<0 \end{cases} \Rightarrow$$

$$\Rightarrow \left(\int_0^t (t-1)\right)\theta(t)\,dt = \underline{\underline{\left(\frac{t^2}{2}-t\right)\theta(t)}}$$

e) $\sin' t = \cos t$

$$\int \sin t\,\theta(t-\pi) + \delta(t-1)\,dt$$

$$\int \sin t\,\theta(t-\pi)\,dt = \begin{cases} \int \sin t, & t>\pi \\ 0, & t<\pi \end{cases} \Rightarrow$$

$$\Rightarrow \left(\int_\pi^t \sin t\,dt\right)\theta(t-\pi) = \left[-\cos t\right]_\pi^t \cdot \theta(t-\pi) =$$

$$= (-\cos t - 1)\,\theta(t-\pi)$$

$$\int \delta(t-1)\,dt = \theta(t-1)$$

$$\underline{\underline{(-\cos t - 1)\,\theta(t-\pi) + \theta(t-1)}}$$