

$$\begin{aligned}
f(x) &= (x-3)^{e^{-x/2}} \\
&= u(v(x)), u = (x-3)^v, v = e^{-x/2} \\
f'(x) &= u'(v) \cdot v'(x), u' = (x-3)^{v-1}, v' = -e^{-x/2} \\
f'(x) &= (x-1)^{e^{-x/2}-1} \left(-\frac{1}{2}e^{-x/2}\right) \\
f''(x) &= \left((x-1)^{e^{-x/2}-1}\right)' \cdot \left(-\frac{1}{2}e^{-x/2}\right) \\
&\quad + (x-1)^{e^{-x/2}-1} \cdot \left(-\frac{1}{2}e^{-x/2}\right)' \\
f''(x) &= (x-1)^{e^{-x/2}-2} \cdot \left(-\frac{1}{2}e^{-x/2}\right)^2 \\
&\quad + (x-1)^{e^{-x/2}-1} \left(+\frac{1}{4}e^{-x/2}\right)
\end{aligned}$$