Sec 62 page 205 #2

The Laurent series of $\dfrac{e^z}{(z+1)^2}$

centered at $z_0=-1$ (in powers of $z+1$).

The Taylor series of e^z centered at $z_0=-1$

is
$$e^z = \sum_{n=0}^{\infty} \frac{e^{-1}}{n!}(z+1)^n, \text{ by Taylor's Theorem}$$

since $\left.\frac{\partial}{\partial z}\right|_{z=-1}(e^z) = e^{-1}$.

Hence,
$$\frac{e^z}{(z+1)^2} = \sum_{n=0}^{\infty} \frac{e^{-1}}{n!}(z+1)^{n-2} =$$

$$\frac{1}{e}\sum_{n=0}^{\infty}\frac{(z+1)^{n-2}}{n!} \underset{\substack{k=n-2 \\ n=k+2}}{=} \frac{1}{e}\sum_{k=-2}^{\infty}\frac{(z+1)^k}{(k+2)!} =$$

$$= \frac{1}{e}\left[\frac{1}{(z+1)^2} + \frac{1}{(z+1)} + \sum_{k=0}^{\infty}\frac{(z+1)^k}{(k+2)!}\right].$$