③ ⓒ $|z|>2 \Rightarrow |\frac{1}{z}|<\frac{1}{2} \wedge |2/z|<1$ ⑦

$$\therefore \frac{z}{(z+1)(z-2)} = \frac{1/3}{z+1} + \frac{(2/3)}{z-2}$$

$$= \frac{1}{3z}\left[\frac{1}{1-(-\frac{1}{z})}\right] + \left(\frac{2}{3}\right)\left(\frac{1}{-2}\right)\left[\frac{1}{1-2/z}\right]$$

$$= \frac{1}{3z}\cdot\sum\left(-\frac{1}{z}\right)^j - \frac{1}{3z}\sum(2/z)^j$$

$$= \frac{1}{3}\sum(-1)^j z^{-j-1} - \frac{1}{3}\sum 2^j (z)^{-j-1}$$

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④ Laurant Series for $\sin(2z)/z^3$, $|z|>0$

$$\therefore \sin(2z) = \sum_{j=0}^{\infty} \frac{(-1)^j (2z)^{2j+1}}{(2j+1)!}$$

$$\Rightarrow \frac{\sin(2z)}{z^3} = \sum_{j=0}^{\infty} \frac{(-1)^j (2)^{2j+1} \cdot z^{2j-2}}{(2j+1)!}$$

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5 $\frac{z+1}{z(z-4)^3}$ in $0<|z-4|<4$

$$\text{since } \frac{z+1}{z(z-4)^3} = \frac{A}{z} + \frac{B}{(z-4)} + \frac{C}{(z-4)^2} + \frac{D}{(z-4)^3}$$

$$= \frac{(-\frac{1}{64})}{z} + \frac{(\frac{1}{64})}{z-4} + \frac{(-1/16)}{(z-4)^2} + \frac{5/4}{(z-4)^3}$$

$$= \left(-\frac{1}{64}\right)\left[\frac{1}{z-4+4}\right] + \left(\frac{1}{64}\right)(z-4)^{-1} + \left(-\frac{1}{16}\right)(z-4)^{-2} + \left(\frac{5}{4}\right)(z-4)^{-3}$$

$$= \left(-\frac{1}{64}\right)\left(\frac{1}{4}\right)\left[\frac{1}{1-(\frac{4-z}{4})}\right] + \downarrow \quad \downarrow \quad \downarrow$$

$$= -\frac{1}{(64)(4)}\cdot\sum\frac{(-1)^j (z-4)^j}{4^j} + \downarrow \quad \downarrow \quad \downarrow$$

$$= \sum_{j=0}^{\infty} \frac{(-1)^{j+1}(z-4)^j}{4^{j+4}}$$