

### Example

$$F(z) = \frac{12z}{(z+1)(z-1)^2}$$

$$\frac{F(z)}{z} = \frac{12}{(z+1)(z-1)^2} = \frac{r_1}{z+1} + \frac{r_2}{(z-1)^2} + \frac{r_3}{z-1}$$

$$r_1 = \frac{12}{(z-1)^2} \Big|_{z=-1} = \frac{12}{(-1-1)^2} = \underline{\underline{3}}$$

$$r_2 = \frac{12}{z+1} \Big|_{z=1} = \frac{12}{1+1} = \underline{\underline{6}}$$

$$r_3 = \frac{d}{dz} \left( \frac{12}{z+1} \right) \Big|_{z=1} = \frac{-12}{(z+1)^2} = \underline{\underline{-3}}$$

$$F(z) = \frac{3z}{z-(-1)} + \frac{6z}{(z-1)^2} + \frac{-3z}{z-1}$$

$$u_0[n] \Leftrightarrow \frac{z}{z-1}$$

$$n u_0[n] \Leftrightarrow \frac{z}{(z-1)^2}$$

$$f[n] = \underline{\underline{3(-1)^n + 6n - 3}} u_0[n]$$