Pole Times Pole

8 $\frac{A}{s+a}$

$$\frac{D}{s+a}\cdot\frac{F\ s+G}{s+b}=\frac{A}{s+a}+\frac{B}{s+b}$$

$$A=\frac{D\ FG-Fa}{b-a}\qquad B=\frac{D\ FG-Fb}{a-b}$$

Three Real Poles

4 $\frac{A}{s+a}$

$$\frac{Ds\ +Es+F}{s+a\ \ s+b\ \ s+c}=\frac{A}{s+a}+\frac{B}{s+b}+\frac{C}{s+c}$$

$$A=\frac{Da\ -Ea+F}{b-a\ \ c-a}\qquad B=\frac{Db\ -Eb+F}{a-b\ \ c-b}\qquad C=\frac{Dc\ -Ec+F}{a-c\ \ b-c}$$

Two Real Poles Times Pole

9 $\frac{A}{s+a}$

$$\frac{Ds+E}{s+a\ \ s+b}\cdot\frac{F\ s+G}{s+c}=\frac{A}{s+a}+\frac{B}{s+b}+\frac{C}{s+c}$$

$$A=\frac{-Da+E\ F\ G-a}{b-a\ \ c-a}\qquad B=\frac{-Db+E\ F\ G-b}{a-b\ \ c-b}$$

$$C=\frac{-Dc+E\ F\ G-c}{a-c\ \ b-c}$$

Conjugate Poles and Real Pole

5 $\frac{A}{s+a}$

$$\frac{Ds\ +Es+F}{s+a\ \ +\omega\ \ s+b}=\frac{A}{s+b}+\frac{B\ s+a\ +C\omega}{s+a\ \ +\omega}$$

$$A=\frac{Db\ -Eb+F}{a-b\ \ +\omega}\qquad B=D-A\quad C=\frac{E+A\ b-a\ -D\ a+b}{\omega}$$

Conjugate Poles Times Pole

10 $\frac{A}{s+a}$

$$\frac{Ds+E}{s+a\ \ +\omega}\cdot\frac{F\ s+G}{s+b}=\frac{A\ s+a\ +C\omega}{s+a\ \ +\omega}+\frac{B}{s+b}$$

$$A=DF-B\qquad B=\frac{-Db+E\ F\ G-b}{a-b\ \ +\omega}$$

$$C=\frac{DFG+EF-DF\ a+b\ -B\ a-b}{\omega}$$

Double Pole and Real Pole

6 $\frac{A}{s+a}$

$$\frac{Ds\ +Es+F}{s+a\ \ s+b}=\frac{A}{s+a}+\frac{B}{s+a}+\frac{C}{s+b}$$

$$A=\frac{Da\ -Ea+F}{b-a}\qquad B=D-C\quad C=\frac{Db\ -Eb+F}{a-b}$$

Double Pole Times Pole

11 $\frac{A}{s+a}$

$$\frac{Ds+E}{s+a}\cdot\frac{F\ s+G}{s+c}=\frac{A}{s+a}+\frac{B}{s+a}+\frac{C}{s+c}$$

$$A=\frac{-Da+E\ F\ G-a}{c-a}\qquad B=DF-C$$

$$C=\frac{-Dc+E\ F\ G-c}{a-c}$$

Triple Pole

7 $\frac{A}{s+a}$

$$\frac{Ds\ +Es+F}{s+a}=\frac{A}{s+a}+\frac{B}{s+a}+\frac{C}{s+a}$$

$$A=Da\ -Ea+F\qquad B=-\ Da+E\quad C=D$$