

$$\begin{aligned}
 & x^2 + 4x + 3 \\
 &= x^2 + x + 3x + 3 \\
 &= x(x + 1) + 3(x + 1) \\
 &= (x + 1)(x + 3)
 \end{aligned}$$

$$\begin{aligned}
 & x^2 - 5x - 6 \\
 &= x^2 + x - 6x - 6 \\
 &= x(x + 1) - 6(x + 1) \\
 &= (x + 1)(x - 6)
 \end{aligned}$$

$$\begin{aligned}
 & -x^2 + 2x + 15 \\
 &= -(x^2 - 2x - 15) \\
 &= -(x^2 + 3x - 5x - 15) \\
 &= -(x(x + 3) - 5(x + 3)) \\
 &= -(x - 5)(x + 3)
 \end{aligned}$$

$$\begin{aligned}
 & 3x^2 - 8x - 16 \\
 &= 3x^2 + 4x - 12x - 16 \\
 &= x(3x + 4) - 4(3x + 4) \\
 &= (x - 4)(3x + 4)
 \end{aligned}$$

$$\begin{aligned}
 & -4x^2 + 6x + 4 \\
 &= -2(2x^2 - 3x - 2) \\
 &= -2(2x^2 + x - 4x - 2) \\
 &= -2(x(2x + 1) - 2(2x + 1)) \\
 &= -2(x - 2)(2x + 1)
 \end{aligned}$$