(2) \(2(x(3x-5)+7(3-5)) = (2x+7)(3x-5)\)

(3) \(x^3+5x^2-5x-25\)

\[= x(x^2+5x) - (5x+25)\]
\[= x(x^2+5) - 5(x+5)\]
\[= (x^2-5)(x+5)\]

(4) \(5x^3-10x^2+3x-6\)

\[= (5x^3-10x^2) + (3x-6)\]
\[= 5x^2(x-2) + 3(x-2)\]
\[= (5x^2+3)(x-2)\]

\[4 - 5x^2\] is the common factor for the first two terms. Notice that \(x^2\) is the smallest exponent there.

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**WEBASSIGN PRACTICE**

(1) \(\frac{4}{7}y(y+1) - 3(y+1)\)

\[= (y+1)\left(\frac{4}{7}y - 3\right)\]
\[= (y+1)\left(\frac{4y}{7} - \frac{21}{7}\right)\]
\[= (y+1)\left(\frac{3y + 7}{7}\right)\]
\[= \boxed{(y+1)(3y+7)\cdot\frac{3}{7}}\]

(2) \(98 - 72z^2\)

\[= 2(49 - 36z^2)\]
\[= 2(7^2 - (6z)^2)\]
\[= 2(7 + 6z)(7 - 6z)\]

\[\text{not finished because the coefficient is not an integer. To } \text{get rid of the fraction, multiply the other terms in the same parenthesis by the denominator. +top/bottom}\]
\[(13) \ (x-9)^2 - 64\]
\[= (x-9)^2 - 8^2\]
\[= (x-9+8)(x-9-8)\]
\[= (x-1)(x-17)\]

**Sum and Difference of Cubes**
- factors into a (binomial) (trinomial)
- both can be factored
- important question is to see what's the cube root of each term

\[a^3 + b^3 = (a+b)(a^2 - ab + b^2)\]
\[a^3 - b^3 = (a-b)(a^2 + ab + b^2)\]

2.9 (i) \[x^3 + 8 = (x+2)(x^2 - 2x + 2) = (x+2)(x^2 - 2x + 4)\]
\[\sqrt[3]{x^3} = x, \quad \sqrt[3]{8} = 2\]
\[x^3 - 8 = (x-2)(x^2 + 2x + 4)\]

2.9 (ii) \[8x^3 - 125\]
\[= (2x-5)(4x^2 + 10x + 25)\]
\[= (2x-5)(2x + 5)^2\]
We assign practice.

(i). \[ x^5 + 2x^3 + x^2 + 2 = (x^5 + 2x^3) + (x^2 + 2) = x^3 (x^2 + 2) + (x^2 + 2) = (x^2 + 1)(x^3 + 1) = (x^2 + 1)(x+1)(x^2 - x + 1) \]

\[ \text{Sum of cubes.} \]

\[ 3 \sqrt[3]{x^3} = x, \quad 3^{3/2} = 1. \]