Partial fractions worksheet

Find $A, B, C, \ldots$. Work together.

1. $\frac{6x+4}{x^2+2x+1} = \frac{A}{x+1} + \frac{B}{(x+1)^2}$

2. $\frac{-5x+4}{x^2-x-2} = \frac{A}{x+1} + \frac{B}{x-2}$

3. $\frac{12x-12+4\sqrt{2}}{x^2-2x-1} = \frac{A}{x-(1+\sqrt{2})} + \frac{B}{x-(1-\sqrt{2})}$

4. $\frac{-7x^2-4x-14}{(x^2+1)(x-2)} = \frac{Ax+B}{x^2+1} + \frac{C}{x-2}$

5. $\dfrac{2x^3 - x^2 + 13x - 5}{(x^2+5)^2} = \dfrac{Ax+B}{x^2+5} + \dfrac{Cx+d}{x^2+5}$

6. $\dfrac{8x^2 - 18x + 10}{(x^2+5)(x-3)} = \dfrac{Ax+B}{x^2+5} + \dfrac{C}{x-3}$

For each of the following, set up as a decomposition to get the partial fractions, but *do not solve* for A, B, C, . . .:

- **Example:** $\frac{3x+1}{(x^2+7)^2(x-2)} = \frac{Ax+B}{x^2+7} + \frac{Cx+D}{(x^2+7)^2} + \frac{E}{x-2}$

- **Example:**

$$\begin{aligned} \frac{9x^3 + 4x + 3}{x^2 - 1} &= 9x + \frac{13x + 3}{x^2 - 1} \\ &= 9x + \frac{A}{x + 1} + \frac{B}{x - 1} \end{aligned}$$

(Polynomial division is necessary here.)

1. $\frac{4x+2}{(x^2+4)(x-2)}$

2. $\frac{3x+1}{(x-5)^2}$

3. $\frac{4x-6}{x^2+9x+8}$

4. $\frac{6x^4+5x^2+6x}{(x+1)(x^2-x+1)}$

5. $\frac{2}{(x^2+4)^4(x-3)^2}$