Further Partial Fraction examples

Express the following expressions in the form of partial fractions:

1.
$$\frac{8x^2 + 2x - 1}{4x^2 - 9}$$

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

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

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

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

Answers

1.
$$2 + \frac{10}{3(2x - 3)} - \frac{7}{3(2x + 3)}$$

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

3.
$$\frac{1}{x + 3} - \frac{4}{(x + 3)^2}$$

4.
$$5 - \frac{3}{2(x + 1)} + \frac{25}{2(x - 3)}$$

5.
$$\frac{4}{9(x + 1)} - \frac{2}{3(x + 1)^2} + \frac{5}{9(x - 2)}$$