

# PARTIAL FRACTIONS AND ITS INTEGRATION

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## 1 Examples: Partial Fraction Decomposition

1. (*Example 1*) Write the partial fraction decomposition for  $\frac{x+7}{x^2-x-6}$ .
2. (*Example 2*) Write the partial fraction decomposition for  $\frac{x+8}{x^2+7x+12}$ .
3. (*Example 3*) Write the form of the partial fraction decomposition for  $\frac{5x^2+20x+6}{x(x+1)^2}$ .
4. (*Example 4*) Write the form of the partial fraction decomposition for  $\frac{3x^2+7x+4}{x^3+4x^2+4x}$ .

## 2 ClassWork: Partial Fraction Decomposition

Write the partial fraction decomposition for the following expressions:

5.  $\frac{2(x+20)}{x^2-25}$
6.  $\frac{3x+11}{x^2-2x-3}$
7.  $\frac{8x+3}{x^2-3x}$
8.  $\frac{10x+3}{x^2+x}$
9.  $\frac{4x-13}{x^2-3x-10}$
10.  $\frac{7x+5}{6(2x^2+3x+1)}$
11.  $\frac{3x^2-2x-5}{x^3+x^2}$
12.  $\frac{3x^2-x+1}{x(x+1)^2}$
13.  $\frac{x+1}{3(x-2)^2}$

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

15.  $\frac{8x^2 + 15x + 9}{(x + 1)^3}$

16.  $\frac{6x^2 - 5x}{(x + 2)^3}$

### 3 ClassWork: Integration by Partial Fractions

Use partial fractions to find the indefinite integral:

17.  $\int \frac{1}{x^2 - 1} \, dx$

18.  $\int \frac{4}{x^2 - 4} \, dx$

19.  $\int \frac{-2}{x^2 - 16} \, dx$

20.  $\int \frac{-4}{x^2 - 4} \, dx$

21.  $\int \frac{1}{2x^2 - x} \, dx$

22.  $\int \frac{2}{x^2 - 2x} \, dx$

23.  $\int \frac{10}{x^2 - 10x} \, dx$

24.  $\int \frac{5}{x^2 + x - 6} \, dx$

25.  $\int \frac{3}{x^2 + x - 2} \, dx$

26.  $\int \frac{1}{4x^2 - 9} \, dx$

27.  $\int \frac{5 - x}{2x^2 + x - 1} \, dx$

28.  $\int \frac{x + 1}{x^2 + 4x + 3} \, dx$

29.  $\int \frac{x^2 - 4x - 4}{x^3 - 4x} \, dx$

30.  $\int \frac{x^2 + 12x + 12}{x^3 - 4x} \, dx$

31.  $\int \frac{x + 2}{x^2 - 4x} \, dx$

$$32. \int \frac{4x^2 + 2x - 1}{x^3 + x^2} \, dx$$

$$33. \int \frac{2x - 3}{(x - 1)^2} \, dx$$

$$34. \int \frac{x^4}{(x - 1)^3} \, dx$$

$$35. \int \frac{3x^2 + 3x + 1}{x(x^2 + 2x + 1)} \, dx$$

$$36. \int \frac{3x}{x^2 - 6x + 9} \, dx$$