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Activity 5.6: More on Partial Fractions

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Solve the following integrals

1. $\int \frac{(t^2 + t - 3) dt}{t^3 + t^2 - 4t - 4}$

$$A(x+2) + B(x-4) = x+5$$

$$A(4+2) = 4+5 \quad B(-2-4) = -2+5$$

$$6A = 9 \quad -6B = 3$$

$$A = \frac{3}{2} \quad B = -\frac{1}{2}$$

2. $\int \frac{2x^3 - 4x^2 - 15x + 5}{x^2 - 2x - 8} dx$

$$\int 2x + \frac{x+5}{(x-4)(x+2)}$$

$$\frac{2x}{x^2 - 2x - 8} + \frac{x+5}{(x-4)(x+2)}$$

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

3. $\int \frac{y^3 - 3y^2 + 1}{y^2 - 1} dy$

$$\int y - 3 + \frac{y-4}{y^2-1}$$

$$\int \frac{y-4}{(y-1)(y+1)}$$

$$A(y+1) + B(y-1) = y-4$$

$$2A = -1 \quad -2B = -3$$

$$A = -\frac{1}{2} \quad B = \frac{3}{2}$$

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

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

$$A(x+3) + B(2x-3) = 3x+1$$

$$A = \frac{7}{9} \quad -9B = -9+10$$

$$A = \frac{7}{9} \quad B = -\frac{10}{9}$$

5. $\int \frac{t-22}{t^2-4t-5} dt$

$$\int \frac{t-22}{(t-5)(t+1)}$$

$$A(t+1) + B(t-5) = t-22$$

$$6A = -17 \quad -6B = -23$$

$$A = -\frac{17}{6} \quad B = \frac{23}{6}$$

6. $\int \frac{x-1}{(x^2-2x-8)} dx$

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

$$A(x+2) + B(x-4) = x-1$$

$$6A = 3 \quad -6B = -3$$

$$A = \frac{1}{2} \quad B = \frac{1}{2}$$