

Section 7.5 Page 549 (5, 13, 27, 42)

5)

$$\frac{2}{x^2 - 2x - 8} = \frac{2}{(x-4)(x+2)} = \frac{A}{x-4} + \frac{B}{x+2}$$

$$Ax + 2A + Bx - 4B = 2$$

$$A + B = 0 \rightarrow A = -B$$

$$2A - 4B = 2 \rightarrow A + 4A = 2 \rightarrow A = 1/3$$

$$B = -1/3$$

$$\frac{2}{x^2 - 2x - 8} = \frac{1}{3(x-4)} - \frac{1}{3(x+2)}$$

13)

$$\int \frac{3}{(x-1)(x+2)} dx = \int \frac{A}{x-1} + \frac{B}{x+2} dx$$

$$Ax + 2A + Bx - B = 3$$

$$A + B = 0 \rightarrow A = -B$$

$$2A - B = 3 \rightarrow 2A + A = 3 \rightarrow A = 1$$

$$B = -1$$

$$\int \frac{3}{(x-1)(x+2)} dx = \int \frac{1}{x-1} + \frac{-1}{x+2} dx = \ln|x-1| - \ln|x+2| + C =$$

$$\ln \left| \frac{x-1}{x+2} \right| + C$$

27)

$$\int \frac{81}{x^2(x-9)} dx = \int \frac{A}{x^2} + \frac{B}{x} + \frac{C}{x-9} dx$$

$$Ax - 9A + Bx^2 - 9Bx + Cx^2 = 81$$

$$B + C = 0$$

$$A - 9B = 0$$

$$-9A = 81 \rightarrow A = -9$$

$$B = -1$$

$$C = 1$$

$$\int \frac{81}{x^2(x-9)} dx = \int -\frac{9}{x^2} + \frac{1}{x} + \frac{1}{x-9} dx =$$

$$\frac{9}{x} + \ln|x| + \ln|x-9| + C =$$

$$\frac{9}{x} + \ln \left| \frac{x}{x-9} \right| + C$$

42)

$$\int \frac{8(x^2+4)}{x(x^2+8)} dx = \int \frac{A}{x} + \frac{Bx+C}{x^2+8} dx$$

$$Ax^2 + 8A + Bx^2 + Cx = 8x^2 + 32$$

$$A + B = 8$$

$$C = 0$$

$$8A = 32 \rightarrow A = 4$$

$$B = 4$$

$$\int \frac{8(x^2+4)}{x(x^2+8)} dx = \int \frac{4}{x} + \frac{4x}{x^2+8} dx = 4 \ln|x| + 2 \ln|x^2+8| + C =$$

$$\ln \left(\frac{x^4}{(x^2+8)^2} \right) + C$$