

6.5 #5

$$\int \frac{x-12}{x^2-4x} dx = \int \frac{A}{x} dx + \int \frac{B}{x-4} dx = \int \frac{3}{x} dx - \int \frac{2}{x-4} dx$$

$$A(x-4) + B(x) = x-12$$

$$\begin{cases} A+B=1 \\ -4A=-12 \end{cases} \quad \begin{cases} A=3 \\ B=-2 \end{cases}$$

$$= 3 \ln|x| - 2 \ln|x-4| + C$$

$$= \ln \frac{|x|^3}{(x-4)^2} + C$$

$$6.5 \# 7. \int \frac{2x^3}{x^2-4} dx = \int 2x dx + \int \frac{8x}{x^2-4} dx = x^2 + 4 \int \frac{du}{u}$$

$$\begin{array}{r} 2x \\ x^2-4 \overline{) 2x^3} \\ \underline{-(2x^3-8x)} \\ 8x \end{array}$$

$$\begin{aligned} u &= x^2-4 \\ du &= 2x dx \end{aligned}$$

$$= x^2 + 4 \ln|x^2-4| + C$$

$$= x^2 + \ln(x^2-4)^4 + C$$

$$6.5 \# 9. \int \frac{2}{x^2+1} dx = 2 \int \frac{1}{1+x^2} dx = 2 \tan^{-1}(x) + C$$

$$6.5 \# 11. \int \frac{7}{2x^2-5x-3} dx = \int \frac{A}{(2x+1)} dx + \int \frac{B}{(x-3)} dx$$

$$A(2x+1) + B(x-3) = 7$$

$$A+2B=7$$

$$-3A+B=7$$

$$+6A-2B=-14$$

$$-7A=-14$$

$$A=2, B=1$$

$$= \int \frac{-2}{2x+1} dx + \int \frac{1}{x-3} dx$$

$$= -\ln|2x+1| + \ln|x-3| + C$$

$$= \ln \left| \frac{x-3}{2x+1} \right| + C$$

$$6.5 \# 13. \int \frac{8x-7}{2x^2-x-3} dx = \int \frac{A}{(2x-3)} dx + \int \frac{B}{(x+1)} dx$$

$$A(2x-3) + B(x+1) = 8x-7$$

$$A+2B=8$$

$$A-3B=-7$$

$$-A+3B=7$$

$$5B=15$$

$$B=3, A=2$$

$$= \int \frac{2}{2x-3} dx + \int \frac{3}{x+1} dx$$

$$= \ln|2x-3| + 3 \ln|x+1| + C$$

$$= \ln \left[(2x-3) \cdot (x+1)^3 \right] + C$$