

$$24d. \int \frac{4t^3 - 5t^2 + 6}{8t} dt = \int \left( \frac{4t^3}{8t} - \frac{5t^2}{8t} + \frac{6}{8t} \right) dt$$

$$= \int \left( \frac{1}{2}t^2 - \frac{5}{8}t + \frac{3}{2} \cdot \frac{1}{t} \right) dt = \frac{1}{2} \frac{t^3}{3} - \frac{5}{8} \frac{t^2}{2} + \frac{3}{2} \ln|t| + C$$

$$= \frac{1}{6}t^3 - \frac{5}{16}t^2 + \frac{3}{2} \ln|t| + C$$

$$24e. \int_{-6}^{-2} \frac{5-7x}{3x^2} dx = \int_{-6}^{-2} \left( \frac{5}{3x^2} - \frac{7x}{3x^2} \right) dx = \int_{-6}^{-2} \left( \frac{5}{3}x^{-2} - \frac{7}{3} \cdot \frac{1}{x} \right) dx$$

$$= \left[ \frac{5}{3} \frac{x^{-1}}{-1} - \frac{7}{3} \ln|x| \right]_{-6}^{-2} = \left[ -\frac{5}{3x} - \frac{7}{3} \ln|x| \right]_{-6}^{-2}$$

$$= \left( \frac{-5}{3(-2)} - \frac{7}{3} \ln|-2| \right) - \left( \frac{-5}{3(-6)} - \frac{7}{3} \ln|-6| \right)$$

$$= \frac{5}{6} - \frac{7}{3} \ln(2) - \left( \frac{5}{18} - \frac{7}{3} \ln 6 \right)$$

$$= \frac{5}{6} - \frac{7}{3} \ln(2) - \frac{5}{18} + \frac{7}{3} \ln 6$$

$$= \frac{5}{6} - \frac{5}{18} + \frac{7}{3} (-\ln 2 + \ln 6) \leftarrow \text{Quotient Rule for logs}$$

$$= \frac{15}{18} - \frac{5}{18} + \frac{7}{3} \left( \ln \frac{6}{2} \right)$$

$$= \frac{10}{18} + \frac{7}{3} \ln 3$$

$$= \frac{5}{9} + \frac{7}{3} \ln 3$$

$$= \frac{5}{9} + \frac{21}{9} \ln 3 = \frac{5 + 21 \ln 3}{9}$$

$$24f. \int \frac{dw}{w(\ln w)^3}$$

$$\text{let } u = \ln w$$

$$\frac{du}{dw} = \frac{1}{w}$$

$$w du = dw$$

$$\int \frac{dw}{w(\ln w)^3} = \int \frac{w du}{w u^3} = \int \frac{du}{u^3} = \int u^{-3} du$$

$$= \frac{u^{-2}}{-2} + C = \frac{-1}{2u^2} + C = \frac{-1}{(\ln w)^2} + C$$