

$$1. \int \frac{3x^2 - 4\sqrt[3]{x} + 2}{5x} dx$$

$$\frac{1}{5} \int (3x^2 - 4x^{1/3} + 2)x^{-1} dx$$

$$\frac{1}{5} \int 3x - 4x^{-2/3} + 2x^{-1} dx$$

$$\frac{1}{5} \left[\frac{3}{2}x^2 - 12x^{1/3} + 2\ln|x| + C \right]$$

$$\frac{3}{10}x^2 - \frac{12}{5}x^{1/3} + \frac{2}{5}\ln|x| + C$$

$$2. \int 3x\sqrt{4x-5} dx$$

$$u = 4x - 5 \quad \int 3x \cdot u^{1/2} \cdot \frac{du}{4}$$

$$\frac{du}{dx} = 4 \quad \frac{3}{4} \int \left(\frac{u+5}{4}\right) \cdot u^{1/2} du$$

$$dx = \frac{du}{4} \quad \frac{3}{16} \int u^{3/2} + 5u^{1/2} du$$

$$x = \frac{u+5}{4} \quad \frac{3}{16} \left[\frac{2}{5} u^{5/2} + \frac{10}{3} u^{3/2} + C \right]$$

$$\frac{3}{40} (4x-5)^{5/2} + \frac{5}{8} (4x-5)^{3/2} + C$$

$$3. \int 3x^2 \cos^5(5x^3) \sin(5x^3) dx$$

$$u = \cos(5x^3)$$

$$\frac{du}{dx} = -15x^2 \sin(5x^3)$$

$$dx = \frac{du}{-15x^2 \sin(5x^3)}$$

$$\int 3x^2 \cdot u^5 \cdot \sin(5x^3) \cdot \frac{du}{-15x^2 \sin(5x^3)}$$

$$-\frac{1}{5} \int u^5 du$$

$$-\frac{1}{30} u^6 + C$$

$$-\frac{1}{30} \cos^6(5x^3) + C$$

$$4. \int \frac{5x^2 e^{\sqrt{3x^3-4}}}{\sqrt{3x^3-4}} dx$$

$$u = (3x^3 - 4)^{1/2}$$

$$\frac{du}{dx} = \frac{1}{2} (3x^3 - 4)^{-1/2} (9x^2)$$

$$\frac{du}{dx} = \frac{9x^2}{2\sqrt{3x^3-4}}$$

$$dx = \frac{2\sqrt{3x^3-4}}{9x^2} du$$

$$\int \frac{5x^2 e^u}{\sqrt{3x^3-4}} \cdot \frac{2\sqrt{3x^3-4}}{9x^2} du$$

$$\frac{10}{9} \int e^u du$$

$$\frac{10}{9} e^u + C$$

$$\frac{10}{9} e^{\sqrt{3x^3-4}} + C$$

$$5. \int 4x \csc^2(3x^2) dx$$

$$u = 3x^2$$

$$\frac{du}{dx} = 6x$$

$$dx = \frac{du}{6x}$$

$$\int 4x \csc^2 u \cdot \frac{du}{6x}$$

$$\frac{2}{3} \int \csc^2 u du$$

$$-\frac{2}{3} \cot u + C$$

$$-\frac{2}{3} \cot(3x^2) + C$$

$$6. \int \frac{3x \cdot 5^{\sin(2x^2)}}{\sec(2x^2)} dx$$

$$\int 3x \cdot 5^{\sin(2x^2)} \cdot \cos(2x^2) dx$$

$$u = \sin(2x^2)$$

$$\frac{du}{dx} = 4x \cos(2x^2)$$

$$dx = \frac{du}{4x \cos(2x^2)}$$

$$\int 3x \cdot 5^u \cdot \cos(2x^2) \cdot \frac{du}{4x \cos(2x^2)}$$

$$\frac{3}{4} \int 5^u du$$

$$\frac{3}{4} \cdot \frac{5^u}{\ln 5} + C$$

$$\frac{3 \cdot 5^{\sin(2x^2)}}{4 \ln 5} + C$$

$$7. \int \frac{18x^2 + 15}{2x^3 + 5x - 2} dx$$

$$u = 2x^3 + 5x - 2$$

$$\frac{du}{dx} = 6x^2 + 5$$

$$dx = \frac{du}{6x^2 + 5}$$

$$\int \frac{18x^2 + 15}{u} \cdot \frac{du}{6x^2 + 5}$$

$$\int \frac{3(6x^2 + 5)}{u} \cdot \frac{du}{6x^2 + 5}$$

$$3 \int \frac{1}{u} du$$

$$3 \ln|u| + C$$

$$3 \ln|2x^3 + 5x - 2| + C$$

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

$$\begin{array}{r} 2x^2 - 4x + 5 \\ x+3 \end{array}$$

$$\int 2x - 10 + \frac{35}{x+3} dx$$

$$\int 2x dx - \int 10 dx + 35 \int \frac{1}{x+3} dx$$

$$x^2 - 10x + 35 \ln|x+3| + C$$

$$35 \int \frac{1}{x+3} dx$$

$$u = x+3$$

$$\frac{du}{dx} = 1$$

$$du = dx$$

$$35 \int \frac{1}{u} du$$

$$35 \ln|u|$$

$$35 \ln|x+3|$$

$$9. \int \frac{2x^3}{\sqrt{4x^2-3}} dx$$

$$u = 4x^2 - 3 \quad \int \frac{2x^3}{u^{1/2}} \cdot \frac{du}{8x}$$

$$\frac{du}{dx} = 8x$$

$$\frac{1}{4} \int x^2 \cdot u^{-1/2} du$$

$$dx = \frac{du}{8x}$$

$$\frac{1}{4} \int \left(\frac{u+3}{4} \right) u^{-1/2} du$$

$$x^2 = \frac{u+3}{4}$$

$$\frac{1}{16} \int u^{1/2} + 3u^{-1/2} du$$

$$\frac{1}{16} \left[\frac{2}{3} u^{3/2} + 6 u^{1/2} + C \right]$$

$$\frac{1}{24} (4x^2-3)^{3/2} + \frac{3}{8} (4x^2-3)^{1/2} + C$$

$$10. \int \frac{1-2\sin(4x)}{2x+\cos(4x)} dx$$

$$u = 2x + \cos(4x)$$

$$\int \frac{1-\cancel{2\sin(4x)}}{u} \cdot \frac{du}{2(1-\cancel{2\sin(4x)})}$$

$$\frac{du}{dx} = 2 + -\sin(4x) \cdot 4$$

$$\frac{1}{2} \int \frac{1}{u} du$$

$$dx = \frac{du}{2-4\sin(4x)}$$

$$\frac{1}{2} \ln|u| + C$$

$$\frac{1}{2} \ln|2x+\cos(4x)| + C$$