

Sec 5.5 day 1 p. 381 (1-7, 9)

$$\textcircled{1} \int e^{-x} dx \quad \left. \begin{array}{l} u = -x \\ du = -1 dx \\ -du = dx \end{array} \right\} \Rightarrow -\int e^u du$$
$$\boxed{-e^{-x} + C}$$

$$\textcircled{2} \int x^3 (2+x^4)^5 dx \quad \left. \begin{array}{l} u = 2+x^4 \\ du = 4x^3 \\ \frac{1}{4} du = x^3 dx \end{array} \right\}$$
$$\frac{1}{4} \int u^5 dx \Rightarrow \frac{1}{4} \frac{u^6}{6} + C = \boxed{\frac{(2+x^4)^6}{24} + C}$$

$$\textcircled{3} \int x^2 \sqrt{x^3+1} dx \quad \left. \begin{array}{l} u = x^3+1 \\ du = 3x^2 dx \\ \frac{1}{3} du = x^2 dx \end{array} \right\}$$
$$\frac{1}{3} \int u^{1/2} du = \frac{1}{3} \frac{2u^{3/2}}{3} + C = \boxed{\frac{2(x^3+1)^{3/2}}{9} + C}$$

$$\textcircled{4} \int \frac{dt}{(1-6t)^4} \quad \left. \begin{array}{l} u = 1-6t \\ du = -6 dt \\ -\frac{1}{6} du = dt \end{array} \right\}$$
$$-\frac{1}{6} \int u^{-4} du = -\frac{1}{6} \frac{u^{-3}}{-3} + C = \boxed{\frac{1}{18(1-6t)^3} + C}$$

$$\textcircled{5} \int \cos^3 \theta \sin \theta d\theta, \quad u = \cos \theta$$

$$du = -\sin \theta d\theta$$

$$-du = \sin \theta d\theta$$

$$-\int u^3 du = -\frac{u^4}{4} + C = \boxed{\frac{-\cos^4 \theta + C}{4}}$$

$$\textcircled{6} \int \frac{\sec^2(1/x)}{x^2} dx, \quad u = 1/x$$

$$du = -1/x^2 dx$$

$$-du = \frac{dx}{x^2}$$

$$-\int \sec^2 u du = -\tan u + C = \boxed{-\tan(1/x) + C}$$

$$\textcircled{7} \int x \sin(x^2) dx, \quad u = x^2$$

$$du = 2x dx$$

$$\frac{1}{2} du = x dx$$

$$\frac{1}{2} \int \sin u du = -\frac{1}{2} \cos u + C = \boxed{\frac{-\cos x^2 + C}{2}}$$

$$\textcircled{9} \int (3x-2)^{20} dx, \quad u = 3x-2$$

$$du = 3 dx$$

$$\frac{1}{3} du = dx$$

$$\frac{1}{3} \int u^{20} du = \frac{1}{3} \frac{u^{21}}{21} + C = \boxed{\frac{(3x-2)^{21} + C}{63}}$$