

$$1. \int \cos 5x \, dx \quad \begin{array}{l} u=5x \\ du=5dx \end{array} \quad \frac{1}{5} \int 5 \cos 5x \, dx = \frac{1}{5} \int \cos u \, du$$

$$= \frac{1}{5} \left[\sin u + C_1 \right] = \boxed{\frac{1}{5} \sin 5x + C}$$

$$2. \int \sec^2 3x \, dx \quad \begin{array}{l} u=3x \\ du=3dx \end{array} = \frac{1}{3} \int 3 \sec^2 3x \, dx = \frac{1}{3} \int \sec^2 u \, du$$

$$= \frac{1}{3} \tan u + C = \boxed{\frac{1}{3} \tan 3x + C}$$

$$3. \int \sin \frac{1}{2} x \, dx \quad \begin{array}{l} u=\frac{1}{2} x \\ du=\frac{1}{2} dx \end{array} = 2 \int \frac{1}{2} \sin \frac{1}{2} x \, dx = 2 \int \sin u \, du$$

$$= 2 \left[-\cos u + C_1 \right] = \boxed{-2 \cos \frac{1}{2} x + C}$$

$$4. \int \sec \frac{x}{3} \tan \frac{x}{3} \, dx \quad \begin{array}{l} u=\frac{x}{3} \\ du=\frac{1}{3} dx \end{array} = 3 \int \frac{1}{3} \sec \frac{x}{3} \tan \frac{x}{3} \, dx$$

$$= 3 \int \sec u \tan u \, du = 3 \sec u + C = \boxed{3 \sec \frac{x}{3} + C}$$

$$5. \int \csc^2(10x) \, dx \quad \begin{array}{l} u=10x \\ du=10dx \end{array} = \frac{1}{10} \int 10 \csc^2(10x) \, dx = \frac{1}{10} \int \csc^2 u \, du$$

$$= \frac{1}{10} \left[-\cot u + C \right] = \boxed{-\frac{1}{10} \cot 10x + C}$$

$$6. \int -\csc \frac{x}{5} \cot \frac{x}{5} \, dx \quad \begin{array}{l} u=\frac{x}{5} \\ du=\frac{1}{5} dx \end{array} = 5 \int -\frac{1}{5} \csc \frac{x}{5} \cot \frac{x}{5} \, dx$$

$$= 5 \int -\csc u \cot u \, du = 5 \csc u + C = \boxed{5 \csc \frac{x}{5} + C}$$

$$7. \int \frac{3}{x-6} dx \quad \begin{matrix} u = x-6 \\ du = dx \end{matrix} = \int \frac{3 du}{u} = 3 \ln|u| + c = \boxed{3 \ln|x-6| + c}$$

$$8. \int \frac{2}{3x-1} dx \quad \begin{matrix} u = 3x-1 \\ du = 3 dx \end{matrix} = \frac{2}{3} \int \frac{3 dx}{3x-1} = \frac{2}{3} \int \frac{du}{u} = \frac{2}{3} \ln|u| + c$$

$$= \boxed{\frac{2}{3} \ln|3x-1| + c}$$

$$9. \int \cos x e^{\sin x} dx \quad \begin{matrix} u = \sin x \\ du = \cos x dx \end{matrix} = \int e^u du = e^u + c = \boxed{e^{\sin x} + c}$$

$$10. \int \sqrt{4x-2} dx \quad \begin{matrix} u = 4x-2 \\ du = 4 dx \end{matrix} = \frac{1}{4} \int 4 \sqrt{4x-2} dx = \frac{1}{4} \int u^{\frac{1}{2}} du$$

$$= \frac{1}{4} \left[\frac{2}{3} u^{\frac{3}{2}} + c \right] = \boxed{\frac{1}{6} (4x-2)^{\frac{3}{2}} + c}$$

$$11. \int (x-8)^{10} dx \quad \begin{matrix} u = x-8 \\ du = dx \end{matrix} = \int u^{10} du = \frac{u^{11}}{11} + c = \boxed{\frac{(x-8)^{11}}{11} + c}$$

$$12. \int (3x-4)^5 dx \quad \begin{matrix} u = 3x-4 \\ du = 3 dx \end{matrix} = \frac{1}{3} \int 3 (3x-4)^5 dx$$

$$= \frac{1}{3} \int u^5 du = \frac{1}{3} \left[\frac{u^6}{6} + c \right]$$

$$= \boxed{\frac{(3x-4)^6}{18} + c}$$