

$$1. \int \frac{x^2 + 3}{x} dx$$

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

$$\frac{x^2}{2} + 3 \ln|x| + C$$

$$\boxed{\frac{x^2}{2} + 3 \ln|x| + C}$$

$$2. \int 1 - \csc x \cot x dx$$

$$\boxed{x + \csc x + C}$$

$$3. 2 \int \sin x dx + 3 \int \cos x dx$$

$$\boxed{-2 \cos x + 3 \sin x + C}$$

$$4. \int x - 2 + x^{-2} dx$$

$$\frac{x^2}{2} - 2x + \frac{x^{-1}}{-1} + C$$

$$\boxed{\frac{x^2}{2} - 2x - \frac{1}{x} + C}$$

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

$$\frac{x^{-1}}{-1} - \frac{x^{-2}}{-2} + C$$

$$\boxed{-\frac{1}{x} + \frac{1}{2x^2} + C}$$

$$6. \int x(x^2+1)^3 dx \quad u = x^2+1$$

$$du = 2x dx$$

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

$$\frac{1}{2} \int u^3 du$$

$$\boxed{\frac{(x^2+1)^4}{8} + C}$$

$$7. \int x e^{-x^2/2} dx \quad u = \frac{-x^2}{2}$$

$$- \int e^u du \quad du = -x dx$$

$$\boxed{-e^{-x^2/2} + C}$$

$$8. \int \frac{1}{1+x^2} dx \quad u=x$$

$$a=1$$

$$\boxed{\arctan x + C}$$

$$9. \int \frac{1}{\sqrt{x}(5+\sqrt{x})^2} dx \quad u = 5+\sqrt{x}$$

$$du = \frac{1}{2} x^{-1/2} dx$$

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

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

$$2 \int u^{-2} du$$

$$2 \frac{u^{-1}}{-1} + C$$

$$\boxed{\frac{-2}{(5+\sqrt{x})} + C}$$

$$10. \int (\sqrt{\cot x} \csc^2 x) dx$$

$$u = \cot x$$

$$du = -\csc^2 x dx$$

$$- \int u^{1/2} du$$

$$- \frac{2}{3} u^{3/2} + C$$

$$\boxed{\frac{-2}{3} \cot^{3/2} x + C}$$

$$11. \int \frac{1}{7x-2} dx \quad u = 7x-2$$

$$du = 7 dx$$

$$\frac{1}{7} du = dx$$

$$\frac{1}{7} \int \frac{1}{u} du$$

$$\boxed{\frac{1}{7} \ln |7x-2| + C}$$

$$12. \int \frac{1}{x \ln(3x)} dx \quad u = \ln(3x)$$

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

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

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

$$\boxed{\ln |\ln(3x)| + C}$$

$$13. \int \frac{1}{\sqrt{4-x^2}} dx \quad u=x \quad a=2$$

$$\boxed{\arcsin \frac{x}{2} + C}$$

$$14. \int \cos(3x+2) dx \quad u=3x+2 \quad du=3dx$$

$$\boxed{\frac{1}{3} \sin(3x+2) + C}$$

$$15. \int \sec(3x) \tan(3x) dx \quad u=3x \quad du=3dx$$

$$\boxed{\frac{1}{3} \sec(3x) + C}$$

$$16. \int 2x^2 + x - 1 dx$$

$$\boxed{\frac{2x^3}{3} + \frac{x^2}{2} - x + C}$$

$$17. \int \frac{x}{x^2+1} dx \quad u=x^2 \quad du=2x dx \quad \frac{1}{2} du = x dx$$

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

$$\boxed{\frac{1}{2} \arctan x^2 + C}$$

$$18. \int 4^x dx$$

$$\frac{1}{\ln 4} \cdot 4^x + C$$

$$\boxed{\frac{4^x}{\ln 4} + C}$$

$$19. \int (x+1)\sqrt{1-x} dx \quad u=1-x \quad x=1-u \quad du=-dx$$

$$- \int (1-u+1)\sqrt{u} du \quad -du=dx$$

$$- \int (2-u)\sqrt{u} du$$

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

$$- \frac{4u^{3/2}}{3} + \frac{2u^{5/2}}{5} + C$$

$$u^{3/2} \left(\frac{4}{3} - \frac{2u}{5} \right) + C$$

$$- (1-x)^{3/2} \left(\frac{4}{3} - \frac{2(1-x)}{5} \right) + C$$

$$20. \int \sin^3 x \cos x \, dx$$

$$u = \sin x \\ du = \cos x \, dx$$

$$\boxed{\frac{\sin^4 x + C}{4}}$$

$$21. \int \frac{x^2}{\sqrt{x^3+3}} \, dx$$

$$u = x^3 + 3 \\ du = 3x^2 \, dx$$

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

$$\frac{2}{3} u^{1/2} + C$$

$$\boxed{\frac{2}{3} (x^3+3)^{1/2} + C}$$

$$22. \int \frac{1}{x\sqrt{4x^2-1}} \, dx$$

$$u = 2x$$

$$a = 1$$

$$du = 2 \, dx$$

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

$$\int \frac{1}{2x\sqrt{4x^2-1}} \, du$$

$$\int \frac{1}{u\sqrt{u^2-1}} \, du$$

$$\boxed{-\operatorname{arccsc} |2x| + C}$$

$$23. \int \frac{e^x}{e^x-1} \, dx$$

$$u = e^x - 1$$

$$du = e^x \, dx$$

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

$$\boxed{\ln |e^x - 1| + C}$$

$$24. \int \tan(4x) \, dx$$

$$\boxed{-\frac{1}{4} \ln |\cos 4x| + C}$$

$$25. \int (x-2)^{1/3} \, dx$$

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