

$$1. \int (\sin x + 5x^2 - e^x) dx = \int \sin x dx + 5 \int x^2 dx - \int e^x dx = -\cos x + \frac{5}{3} x^3 - e^x + C$$

$$2. \int 2^x \cdot 3^{2x} dx = \int (2 \cdot 3^2)^x dx = \int 18^x dx = \frac{18^x}{\ln 18} + C.$$

$$3. \int \left( \frac{3}{x} + \frac{5}{x^2} \right) dx = 3 \int \frac{dx}{x} + 5 \int x^{-2} dx = 3 \ln|x| - \frac{5}{x} + C.$$

$$4. \int \sqrt{u^2 + a^2} du = \frac{u}{2} \sqrt{u^2 + a^2} + \frac{a^2}{2} \ln|u + \sqrt{u^2 + a^2}| + C.$$

$$5. \int \frac{2 - \sin^2 x}{\sin^2 x} dx = 2 \int \frac{dx}{\sin^2 x} - \int dx = -\operatorname{ctgx} - x + C.$$

6.

$$\int (\sqrt{x} + 5)^2 dx = \int (x - 10\sqrt{x} + 25) dx = \int x dx - 10 \int x^{\frac{1}{2}} dx + 25 \int dx = \frac{x^2}{2} - \frac{20}{3} \sqrt{x^3} + 25x + C.$$

$$7. \int \frac{dx}{\sin^2 x \cdot \cos^2 x} = \int \frac{\cos^2 x + \sin^2 x}{\sin^2 x \cdot \cos^2 x} dx = \int \frac{dx}{\sin^2 x} + \int \frac{dx}{\cos^2 x} = -\operatorname{ctgx} + \operatorname{tgx} + C.$$

$$8. \int \operatorname{tg}^2 x dx = \int \left( \frac{1}{\cos^2 x} - 1 \right) dx = \int \frac{dx}{\cos^2 x} - \int dx = \operatorname{tgx} - x + C.$$

$$9. \int \frac{x^2 + 5x - 1}{\sqrt{x}} dx = \int \left( x^{\frac{3}{2}} + 5x^{\frac{1}{2}} - x^{-\frac{1}{2}} \right) dx = \int x^{\frac{3}{2}} dx + 5 \int x^{\frac{1}{2}} dx - \int x^{-\frac{1}{2}} dx =$$

$$= \frac{2}{5} x^{\frac{5}{2}} + \frac{10}{3} x^{\frac{3}{2}} - 2x^{\frac{1}{2}} + C.$$