

$$1) \int \frac{2x+3}{(x-2)(x+5)} dx = \int \frac{2x+3}{x^2+3x-10} dx = \ln|x^2+3x-10| + C$$

$$2) \int e^{2x} \cos 3x dx = \frac{3 \sin 3x + 2 \cos 3x}{13} e^{2x} + C$$

$$3) \int_0^{\ln 2} x e^{-x} dx$$

$$\int x e^{-x} dx = - \int x d e^{-x} = -x e^{-x} - \int e^{-x} dx = -x e^{-x} + e^{-x} + C$$

$$\int_0^{\ln 2} x e^{-x} dx = -\ln 2 e^{-\ln 2} + e^{-\ln 2} - 1 = -\frac{\ln 2}{2} + \frac{1}{2} - 1 = -\frac{\ln 2 + 1}{2}$$

$$4) \int_2^{\infty} \frac{dx}{x^2+x-2} = \int_2^{\infty} \frac{dx}{(x-1)(x+2)} = \int_2^{\infty} \left[\frac{1}{x-1} - \frac{1}{x+2} \right] dx$$

$$= \lim_{b \rightarrow \infty} (\ln|x-1| - \ln|x+2|) - (\ln 1 - \ln 4) = \ln 4 - \ln 1$$

$$5) \int \ln x dx = x \cdot \ln x - \int x d(\ln x) = x \ln x - \int dx = x \ln x - x + C$$

$$\int_0^1 \ln x dx = \ln 1 - 1$$