(1) $$\int \frac{dx}{2x^2+4x+2} = \frac{1}{2}\int \frac{dx}{(x+1)^2} = -\frac{1}{2(x+1)}$$

(2) $$\int \frac{x\,dx}{2x^2+4x+2} = \frac{1}{2}\int \frac{x\,dx}{(x+1)^2} = \frac{1}{2}\int \frac{x+1-1}{(x+1)^2}\,dx =$$

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

(3) $$\int \frac{dx}{x^2+3x-4} = \int \frac{dx}{(x-1)(x+4)} = \frac{1}{5}\ln\left|\frac{x-1}{x+4}\right|$$

(4) $$\int \frac{dx}{x^2-3x+4} = \int \frac{dx}{\left(x-\frac{3}{2}\right)^2+\frac{7}{4}} = \frac{2}{\sqrt{7}}\operatorname{arctg}\left(\frac{x-\frac{3}{2}}{\frac{\sqrt{7}}{2}}\right)$$

(5) $$\int \frac{x+1}{x^2+2x+5}\,dx = \frac{1}{2}\int \frac{f'(x)}{f(x)}\,dx = \frac{1}{2}\ln\left(x^2+2x+5\right)$$

$$\left[\quad f(x) = x^2+2x+5 \right]$$

(6) $$\int \frac{\ln(\ln(x))}{x}\,dx = \int \ln(y)\,dy \,\Big|_{y=\ln(x)}$$

$$\int 1 \cdot \ln(y)\, dy \overset{\text{(per parti)}}{=} y \ln(y) - \int y \frac{1}{y}\, dy =$$

$$y \ln(y) - y$$

in conclusione $\displaystyle\int \frac{\ln(\ln(x))}{x}\, dx = \ln(x)\left[\ln(\ln(x)) - 1\right]$

7 $\displaystyle\int \cos(5x+1)\, dx = \frac{1}{5} \sin(5x+1)$

8 $\displaystyle\int x e^{x^2+1}\, dx = \frac{1}{2} \int e^y\, dy \Big|_{y=x^2+1} = \frac{1}{2} e^{x^2+1}$

9 $\displaystyle\int x^2 \ln x\, dx = \frac{x^3}{3} \ln(x) - \int \frac{x^3}{3} \cdot \frac{1}{x}\, dx = \frac{x^3}{3} \ln(x) - \frac{x^3}{9}$

10 $\displaystyle\int x^2 e^x\, dx = x^2 e^x - \int 2x \cdot e^x\, dx = x^2 e^x - 2x e^x + 2\int e^x\, dx$

$$= x^2 e^x - 2x e^x + 2e^x$$

11 $\displaystyle\int_1^2 \sin(2x) = \left[-\frac{1}{2} \cos(2x)\right]_1^2 = -\frac{1}{2}\left(\cos(4) - \cos(2)\right)$

12 $\displaystyle\int_1^3 \frac{dx}{x^2} = \left[-\frac{1}{x}\right]_1^3 = -\frac{1}{3} + 1$

$$\lim_{a \to 0^+} \int_a^1 \frac{dx}{\sqrt{x}}$$

calcolo $\displaystyle\int \frac{dx}{\sqrt{x}} = \int x^{-\frac{1}{2}} \, dx =$

$= 2\sqrt{x}$

$$\int_a^1 \frac{dx}{\sqrt{x}} = 2 - 2\sqrt{a}$$

$$\lim_{a \to 0} \left(2 - 2\sqrt{a}\right) = 2$$

$$\lim_{x \to \infty} \int_1^x \frac{dt}{t^{3/2}} = \lim_{x \to \infty} -\frac{2}{\sqrt{x}} + \frac{2}{\sqrt{1}} = 2$$

$$\int \frac{dt}{t^{3/2}} = \frac{1}{-\frac{3}{2}+1} t^{-\frac{3}{2}+1} = -2\, t^{-\frac{1}{2}}$$