$$\int \frac{6x+5}{x^2+3x-40}\,dx = \int \frac{A}{x+8}\,dx + \int \frac{B}{x-5}\,dx = \frac{43}{13}\int \frac{1}{x+8}\,dx + \frac{35}{13}\int \frac{1}{x-5}\,dx$$

$\downarrow D>0$

$x_{1,2} = -8, 5$

$x^2+3x-40 = (x+8)(x-5)$

$6x+5 = A(x-5)+B(x+8)$

$6x+5 = x(A+B) - 5A + 8B$

$A+B=6$

$-5A+8B=5$ $\rightarrow$ $A=\frac{43}{13}$, $B=\frac{35}{13}$

$$\frac{43}{13}\ln|x+8| + \frac{35}{13}\ln|x-5| + C$$

$$\int \frac{7x+2}{x^2+4x+5}\,dx = \int \frac{A(2x+4)+B}{x^2+4x+5}\,dx = \left[\begin{array}{c} 7x+2 = 2Ax+4A+B \\ A=\frac{7}{2},\ B+4A=2 \\ B=-12 \end{array}\right] =$$

$\downarrow D<0$

$$= \int\left(\frac{\frac{7}{2}(2x+4)}{x^2+4x+5} - \frac{12}{x^2+4x+5}\right)dx =$$

$x^2+4x+5 = (x+2)^2+1$

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$$= \frac{7}{2}\int \frac{2x+4}{x^2+4x+5}\,dx - 12\int \frac{1}{(x+2)^2+1}\,dx = \frac{7}{2}\ln|x^2+4x+5| - 12\,\mathrm{ARCTG}(x+2) + C$$

$$\int \frac{2x-1}{(x+1)^2}\,dx = \int\left(\frac{A}{x+1} + \frac{B}{(x+1)^2}\right)dx = \left[\begin{array}{c} 2x-1 = A(x+1)+B \\ 2x-1 = Ax+A+B \\ 2=A \\ -1 = A+B,\ B=-3 \end{array}\right] =$$

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

$x+1=t$

$-3\int \frac{1}{t^2}\,dt = -3\cdot\frac{t^{-1}}{-1}$ $\nearrow$

$$\int \frac{2x+5}{x^2+3x+5}\,dx = \int\left(\frac{2x+3}{x^2+3x+5} + \frac{2}{x^2+3x+5}\right)dx =$$

$$= \int \frac{2x+3}{x^2+3x+5}\,dx + 2\int \frac{1}{\left(x+\frac{3}{2}\right)^2+\frac{11}{4}}\,dx =$$

$$= \ln|x^2+3x+5| + 2\cdot\sqrt{\frac{4}{11}}\,\mathrm{ARCTG}\,\frac{(x+3)}{\sqrt{\frac{11}{4}}} + C,\ C\in R$$

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$$\int \frac{6x+1}{x^2+2x+1}\,dx = \int \frac{6x+1}{(x+1)^2}\,dx = \int\left(\frac{A}{x+1} + \frac{B}{(x+1)^2}\right)dx =$$

$$\left[\begin{array}{c} 6x+1 = A(x+1)+B \\ A=6 \\ A+B=1 \\ B=-5 \end{array}\right]$$

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$$= 6\int \frac{1}{x+1}\,dx - 5\int \frac{1}{(x+1)^2}\,dx = 6\ln|x+1| + \frac{5}{x+1} + C,\ C\in R$$

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$$\int \frac{7x+3}{x^2+3x+5}\,dx = \int \frac{A(2x+3)+B}{x^2+3x+5}\,dx = \left[\begin{array}{c} 7x+3 = A2x+3A+B \\ A=\frac{7}{2} \\ 3A+B=3 \\ B=-\frac{15}{2} \end{array}\right] =$$

$$\left[\left(x+\frac{3}{2}\right)^2+\frac{11}{4}\right]$$

$$= \frac{7}{2}\int \frac{2x+3}{x^2+3x+5}\,dx - \frac{15}{2}\int \frac{1}{\left(x+\frac{3}{2}\right)^2+\frac{11}{4}}\,dx =$$

$$= \frac{7}{2}\ln|x^2+3x+5| - \frac{15}{2}\sqrt{\frac{4}{11}}\,\mathrm{ARCTG}\,\frac{(x+3)}{\sqrt{\frac{11}{4}}} + C,\ C\in R$$

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