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

$\frac{1}{4}\int \frac{3}{\frac{4+x^2}{4}}\,dx = \frac{3\cdot 2}{4}\int \frac{\frac{1}{2}}{1+(\frac{x}{2})^2}\,dx$

$\frac{3}{2}\arctg\frac{x}{2}+C$

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

$x^2-2x+1 \quad |\,x+1$

$-x^2-x \quad\quad x-3$

$-3x+1$

$3x+3$

4

$\int x-3+\frac{4}{1+x}\,dx =$

$\frac{x^2}{2}-3x+4\ln|1+x|+C$

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$\int \frac{x^4+2x-6}{x^3+x^2-2x}\,dx$

$x^4+2x-6 \quad |\,x^3+x^2-2x$

$-x^4-x^3+2x^2 \quad\quad x-1$

$-x^3+2x^2+2x-6$

x^3+x^2-2x

$3x^2-6$

$\int x-1+\frac{3x^2-6}{x^3+x^2-2x}\,dx$

$\frac{x^2}{2}-x+\int \frac{3x^2-6}{x^3+x^2-2x}\,dx$

$x^3+x^2-2x = x(x^2+x-2) = x(x-1)(x+2)$

$\int \frac{3x^2-6}{x(x-1)(x+2)}\,dx = \int \frac{A}{x}\,dx + \int \frac{B}{x-1}\,dx + \int \frac{C}{x+2}\,dx$

$3x^2-6 = A(x-1)(x+2)+Bx(x+2)+Cx(x-1)$

$x=0 \quad -6=-2A \quad A=3$

$x=1 \quad -3=3B \quad B=-1$

$x=-2 \quad 6=6C \quad C=1$

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

$\frac{x^2}{2}-x+3\ln|x|-\ln|x-1|+\ln|x+2|+C$

$\frac{x^2}{2}-x+\ln\frac{x^3(x+2)}{x-1}+C$

$\frac{x^2}{2}-x+\ln\left|\frac{x^4+2x^3}{x-1}\right|+C$

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(3) $\int \frac{6x^5-7x^4-5x^3-5x+2}{x^6-2x^5+2x^3-x^2}\,dx$

$x^6-2x^5+2x^3-x^2 = x^2(x-1)^3(x+1)$

$\frac{6x^5-7x^4-5x^3-5x+2}{x^2(x-1)^3(x+1)} = \frac{A}{x}+\frac{B}{x^2}+\frac{C}{x-1}+\frac{D}{(x-1)^2}+\frac{E}{(x-1)^3}+\frac{F}{x+1}$

$6x^5-7x^4-5x^3-5x+2 = Ax(x-1)^3(x+1)+B(x-1)^3(x+1)$
$+Cx^2(x-1)^2(x+1)+Dx^2(x-1)(x+1)+Ex^2(x+1)$
$+F(x^2)(x-1)^3$

$x=0$
$x=1$
$x=-1$
$\left.\begin{matrix}x=2\\x=-2\\x=3\end{matrix}\right]$ Tres valores los me faltan

$A=1 \quad B=-2 \quad C=5 \quad D=2 \quad E=-4 \quad F=0$

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$$\int \frac{1}{x}dx+\int \frac{-2}{x^2}dx+\int \frac{5}{x-1}dx+\int \frac{2}{(x-1)^2}dx$$
$$+\int \frac{-4}{(x-1)^3}dx+\int \frac{0}{x+1}dx$$
$$\ln|x|-2\frac{x^{-1}}{-1}+5\ln|x-1|+2\frac{(x-1)^{-1}}{-1}$$
$$-4\frac{(x-1)^{-2}}{-2}+C$$
$$\ln|x|+\frac{2}{x}+5\ln|x-1|-\frac{2}{x-1}$$
$$+\frac{2}{(x-1)^2}+C$$

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$$\int \frac{2x+3}{x^2+1}dx$$
$x^2+1=0 \quad x=\pm\sqrt{-1}$
$$\int \frac{2x}{x^2+1}dx+\int \frac{3}{x^2+1}dx$$
$$\ln|x^2+1|+3\operatorname{arctg} x+C$$

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$$\int \frac{2x+3}{x^2+x+1}dx$$
$x=\frac{-1\pm\sqrt{1-4}}{2}$ ∄
$$\int \frac{2x+1+2}{x^2+x+1}dx=\int \frac{2x+1}{x^2+x+1}dx+\int \frac{2\,dx}{x^2+x+1}$$
$$\ln|x^2+x+1|+2\int \frac{1}{x^2+x+1}dx$$
$$\int \frac{1}{x^2+x+1}dx \qquad \int \frac{f'(x)}{1+[f(x)]^2}dx$$
$$\int \frac{1}{\left(x+\frac{1}{2}\right)^2+\frac{3}{4}}dx=\frac{1}{3/4}\int \frac{1}{\frac{(2x+1)^2}{4}+\frac{3}{4}}dx$$
$x=2\cdot x$ □
$$=\frac{4\sqrt{3}}{3^2}\int \frac{1\ 2/\sqrt{3}}{\left(\frac{2x+1}{\sqrt{3}}\right)^2+1}dx$$
$$=\frac{2\sqrt{3}}{3}\operatorname{arctg}\left(\frac{2x+1}{\sqrt{3}}\right)+C$$
SOL $\ln|x^2+x+1|+\frac{4\sqrt{3}}{3}\operatorname{arctg}\left(\frac{2x+1}{\sqrt{3}}\right)$ ×C

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$$\int \frac{3x-1}{x^2+x+1}dx$$
$x=\frac{-1\pm\sqrt{1-4}}{2}$ ∄
$$\frac{3}{2}\int \frac{2}{3}\frac{(3x-1)}{x^2+x+1}dx$$
$$\frac{3}{2}\int \frac{2x-2/3}{x^2+x+1}dx$$
$$\frac{3}{2}\int \frac{2x+1-2/3-1}{x^2+x+1}dx$$
$$\frac{3}{2}\int \frac{2x+1}{x^2+x+1}dx+\frac{3}{2}\left(-\frac{5}{3}\right)\int \frac{1\,dx}{x^2+x+1}$$
$$\frac{3}{2}\ln|x^2+x+1|-\frac{5}{2\frac{3}{4}}\int \frac{1}{\left(x+\frac{1}{2}\right)^2+\frac{3}{4}}dx$$
$x=2x$ □ $\square=\frac{x}{2x}=\frac{1}{2}$
$$\frac{3}{2}\ln|x^2+x+1|-\frac{20}{6}\int \frac{1\ 2/\sqrt{3}}{\left(\frac{2x+1}{\sqrt{3}}\right)^2+1}$$
$$\frac{3}{2}\ln|x^2+x+1|-\frac{5}{3}\sqrt{3}\operatorname{arctg}\left(\frac{2x+1}{\sqrt{3}}\right)+C$$

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Deberes

1. $\int \frac{1}{x^2-x-2}\,dx$
2. $\int \frac{5x^2}{x^3-3x^2+3x-1}\,dx$
3. $\int \frac{1}{1+4x^2}\,dx$
4. $\int \frac{1}{x^2+2x+2}\,dx$
5. $\int \frac{3x+1}{x^2+3x+3}\,dx$

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