Calcular las siguientes integrales:

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

x^4			$-2x$	-6	$x^3 + x^2 - 2x$
$-x^4$	$-x^3$	$+2x^2$			$x - 1$
	$-x^3$	$+2x^2$	$-2x$		
	$+x^3$	$+x^2$	$-2x$		
		$3x^2$	$-4x$	-6	

$$\frac{x^4 - 2x - 6}{x^3 + x^2 - 2x} = x - 1 + \frac{3x^2 - 4x - 6}{x^3 + x^2 - 2x}$$

$$\int \frac{x^4 - 2x - 6}{x^3 + x^2 - 2x}\,dx = \int x\,dx - \int 1dx + \int \frac{3x^2 - 4x - 6}{x^3 + x^2 - 2x}\,dx$$

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

$$x^3 + x^2 - 2x = x\left(x^2 + x - 2\right) = x\,(x-1)\,(x+2)$$

	1	1	-2
1		1	2
	1	2	0

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

$$x^3 + x^2 - 2x = x\left(x^2 + x - 2\right) = x\,(x-1)\,(x+2)$$

$$\frac{3x^2 - 4x - 6}{x^3 + x^2 - 2x} = \frac{A}{x} + \frac{B}{x-1} + \frac{C}{x+2} = \frac{A(x-1)(x+2) + Bx\,(x+2) + Cx\,(x-1)}{x\,(x-1)\,(x+2)}$$

$$3x^2 - 4x - 6 = A(x-1)(x+2) + Bx\,(x+2) + Cx\,(x-1)$$

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

$$x = 1; \quad -7 = 3B; \quad B = \frac{-7}{3}$$

$$x = -2; \quad 14 = 6C; \quad C = \frac{14}{6} = \frac{7}{3}$$

$$\int \frac{3x^2 - 4x - 6}{x^3 + x^2 - 2x}\,dx = \int \frac{3}{x}\,dx + \int \frac{\frac{-7}{3}}{x-1}\,dx + \int \frac{\frac{7}{3}}{x+2}\,dx = 3\,Ln|x| - \frac{7}{3}\,Ln|x-1| + \frac{7}{3}\,Ln|x+2|$$

Finalmente,

$$\int \frac{x^4 - 2x - 6}{x^3 + x^2 - 2x}\,dx = \int x\,dx - \int 1dx + \int \frac{3x^2 - 4x - 6}{x^3 + x^2 - 2x}\,dx = \frac{x^2}{2} - x + 3\,Ln|x| - \frac{7}{3}\,Ln|x-1| + \frac{7}{3}\,Ln|x+2| + C$$

$$\int \frac{2x^2-17}{x^3-3x-2}dx =$$

	1	0	-3	-2
-1		-1	1	2
	1	-1	-2	0
-1		-1	2	
	1	-2	0	

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

$$\frac{2x^2-17}{x^3-3x-2}=\frac{A}{x+1}+\frac{B}{(x+1)^2}+\frac{C}{x-2}=\frac{A(x+1)(x-2)+B(x-2)+C(x+1)^2}{(x+1)^2\,(x-2)}$$

$$2x^2-17=A(x+1)(x-2)+B(x-2)+C(x+1)^2$$

$$x=-1;\quad -15=-3B;\quad B=5$$

$$x=2;\quad -9=9C;\quad C=-1$$

$$x=0;\quad -17=-2A-2B+C;\quad -17=-2A-10-1;\quad -17+11=-2A;\quad -6=-2A;\quad A=3$$

$$\int \frac{2x^2-17}{x^3-3x-2}dx=\int \frac{3}{x+1}dx+\int \frac{5}{(x+1)^2}dx+\int \frac{-1}{x-2}dx=3\,Ln|x+1|-\frac{5}{x+1}-Ln|x-2|+C$$

$$\int \frac{5}{(x+1)^2}dx=5\int (x+1)^{-2}dx=5\,\frac{(x+1)^{-2+1}}{-2+1}=-5(x+1)^{-1}=\frac{-5}{x+1}$$

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$$\int x^4 e^{x^5}dx=\left\{t=x^5 \rightarrow \quad dt=5x^4dx \quad \rightarrow \quad \frac{dt}{5}=x^4dx\right\}=$$

$$=\int e^t\,\frac{dt}{5}=\frac{1}{5}\int e^t dt=\frac{1}{5}\,e^t+C=\frac{1}{5}\,e^{x^5}+C$$

$$\int x\ sen\ x^2dx=\left\{t=x^2 \quad \rightarrow \quad dt=2x\,dx \quad \rightarrow \quad \frac{dt}{2}=x\,dx\right\}=$$

$$=\int sen\ t\,\frac{dt}{2}=\frac{1}{2}(-\cos t)+C=\frac{-\cos x^2}{2}+C$$

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