$$\begin{cases} y = t\sin t \\ x = \cos t + t^2 \sin 2t \end{cases}$$

$$y'_x = \frac{y'_t}{x'_t}$$

$$y'_t = (t \cdot \sin t)'_t = t' \cdot \sin t + t \cdot (\sin t)' = \sin t + t\cos t$$

$$(t)' = 1$$

$$(\sin t)' = \cos t$$

$$x'_t = (\cos t + t^2 \cdot \sin 2t)'_t = -\sin t + (t^2)' \cdot \sin 2t + t^2 \cdot (\sin 2t)' =$$

$$= -\sin t + 2t\sin 2t + 2t^2 \cos 2t$$

$$(\cos t)' = -\sin t$$

$$(t^n)' = n t^{n-1}$$

$$(\sin kt)' = k \cdot \cos kt$$

$$y'_x = \frac{\sin t + t\cos t}{-\sin t + 2t\sin 2t + 2t^2 \cos 2t}$$

$$\begin{cases} y = t\sin t \\ x = \cos t + t^2 \sin 2t \end{cases}$$

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$$(\sin kt)' = k \cdot \cos kt$$

$$y'_x = \frac{\sin t + t \cos t}{-\sin t + 2t \sin 2t + 2t^2 \cos 2t}$$

$$(u \cdot v)' = u' \cdot v + u \cdot v'$$

$y = \frac{5x+1}{3x^2+6x+1}$ $\qquad y' \qquad dy = y' \cdot dx$

$$y' = \left(\frac{5x+1}{3x^2+6x+1}\right)' = \frac{(5x+1)'\cdot(3x^2+6x+1) - (5x+1)(3x^2+6x+1)'}{(3x^2+6x+1)^2} =$$

$$= \frac{5(3x^2+6x+1)-(5x+1)(6x+6)}{(3x^2+6x+1)^2} = \frac{15x^2+\cancel{30x}+5-30x^2-\cancel{30x}-6x-6}{(3x^2+6x+1)^2}$$

$$= \frac{-15x^2-6x-1}{(3x^2+6x+1)^2}$$

$$\left(\frac{u}{v}\right)' = \frac{u'\cdot v - u\cdot v'}{v^2}$$

$$(x^n)' = n\cdot x^{n-1}$$

$$dy = \frac{-15x^2-6x-1}{(3x^2+6x+1)^2}\cdot dx$$

$$y = \frac{5x+1}{3x^2+6x+1} \qquad y' \qquad dy = y' \cdot dx$$

$$y' = \left(\frac{5x+1}{3x^2+6x+1}\right)' = \frac{(5x+1)' \cdot (3x^2+6x+1) - (5x+1)(3x^2+6x+1)'}{(3x^2+6x+1)^2} =$$

$$= \frac{5(3x^2+6x+1) - (5x+1)(6x+6)}{(3x^2+6x+1)^2} = \frac{15x^2 + \cancel{30x} + 5 - 30x^2 - \cancel{30x} - 6x - 6}{(3x^2+6x+1)^2}$$

$$= \frac{-15x^2 - 6x - 1}{(3x^2+6x+1)^2}$$

$$\left(\frac{u}{v}\right)' = \frac{u' \cdot v - u \cdot v'}{v^2}$$

$$(x^n)' = n \cdot x^{n-1}$$

$$dy = \frac{-15x^2 - 6x - 1}{(3x^2+6x+1)^2} \cdot dx$$

$$y = \frac{5x+1}{3x^2+6x+1} \qquad y' \qquad dy = y' \cdot dx$$

$$y' = \left(\frac{5x+1}{3x^2+6x+1}\right)' = \frac{(5x+1)' \cdot (3x^2+6x+1) - (5x+1)(3x^2+6x+1)'}{(3x^2+6x+1)^2} =$$

$$= \frac{5(3x^2+6x+1) - (5x+1)(6x+6)}{(3x^2+6x+1)^2} = \frac{15x^2+\cancel{30x}+5-30x^2-\cancel{30x}-6x-6}{(3x^2+6x+1)^2} =$$

$$= \frac{-15x^2-6x-1}{(3x^2+6x+1)^2}$$

$$\boxed{\left(\frac{u}{v}\right)' = \frac{u' \cdot v - u \cdot v'}{v^2} \qquad (x^n)' = n \cdot x^{n-1}}$$

$$\boxed{dy = \frac{-15x^2-6x-1}{(3x^2+6x+1)^2} \cdot dx}$$

4.

$$\int_0^4 x\sqrt{25-x^2}\,dx = \left\{ \begin{array}{l} t = 25-x^2 \\ dt = (25-x^2)'dx = -2x\,dx \\ dx = \dfrac{dt}{-2x} \\ x_1 = 0 \Rightarrow t_1 = 25-0^2 = 25 \\ x_2 = 4 \Rightarrow t_2 = 25-4^2 = 9 \end{array} \right\}$$

$$= \int_{25}^{9} \cancel{x}\sqrt{t}\,\frac{dt}{-2\cancel{x}} = -\frac{1}{2}\int_{25}^{9}\sqrt{t}\,dt =$$

$$= -\frac{1}{2}\int_{25}^{9} t^{\frac{1}{2}}\,dt = -\frac{1}{2}\,\frac{t^{\frac{1}{2}+1}}{\frac{1}{2}+1}\Bigg|_{25}^{9} =$$

$$= -\frac{1}{\cancel{2}}\,\frac{t^{3/2}}{\frac{3}{\cancel{2}}}\Bigg|_{25}^{9} = -\frac{1}{3}\cdot t\sqrt{t}\,\Bigg|_{25}^{9} = -\frac{1}{3}\,9\sqrt{9} + \frac{1}{3}\,25\sqrt{25} =$$

$$= -9 + \frac{125}{3} = \frac{125-27}{3} = \frac{98}{3} = \boxed{32\frac{2}{3}}$$

$$\int_a^b t^n\,dt = \frac{t^{n+1}}{n+1}\Bigg|_a^b = \frac{b^{n+1}}{n+1} - \frac{a^{n+1}}{n+1}$$

$$t^{\frac{3}{2}} = t^{1+\frac{1}{2}} = t\cdot\sqrt{t}$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

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$$\int_0^4 x\sqrt{25-x^2}\,dx = \left\{\begin{array}{l} t = 25-x^2 \\ \underline{dt} = (25-x^2)'dx = \underline{-2x\,dx} \\ dx = \dfrac{dt}{-2x} \\ x_1 = 0 \Rightarrow t_1 = 25-0^2 = 25 \\ x_2 = 4 \Rightarrow t_2 = 25-4^2 = 9 \end{array}\right\} =$$

$$= \int_{25}^{9} \cancel{x}\sqrt{t}\,\frac{dt}{-2\cancel{x}} = -\frac{1}{2}\int_{25}^{9}\sqrt{t}\,dt =$$

$$= -\frac{1}{2}\int_{25}^{9} t^{\frac{1}{2}}\,dt = -\frac{1}{2}\,\frac{t^{\frac{1}{2}+1}}{\frac{1}{2}+1}\Bigg|_{25}^{9} =$$

$$= -\frac{1}{\cancel{2}}\,\frac{t^{3/2}}{\frac{3}{\cancel{2}}}\Bigg|_{25}^{9} = -\frac{1}{3}\cdot t\sqrt{t}\,\Bigg|_{25}^{9} = -\frac{1}{3}9\sqrt{9} + \frac{1}{3}25\sqrt{25} =$$

$$= -9 + \frac{125}{3} = \frac{125-27}{3} = \frac{98}{3} = \boxed{32\frac{2}{3}}$$

$$\int_a^b t^n\,dt = \frac{t^{n+1}}{n+1}\Bigg|_a^b = \frac{b^{n+1}}{n+1} - \frac{a^{n+1}}{n+1}$$

$$t^{\frac{3}{2}} = t^{1+\frac{1}{2}} = t\cdot\sqrt{t}$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

$$y' - y\,tg\,x = \cos x$$

$$\left\{ \begin{aligned} y &= u \cdot v \\ y' &= u' \cdot v + u \cdot v' \end{aligned} \right\}$$

$$u' \cdot v + u \cdot v' - u \cdot v\,tg\,x = \cos x$$

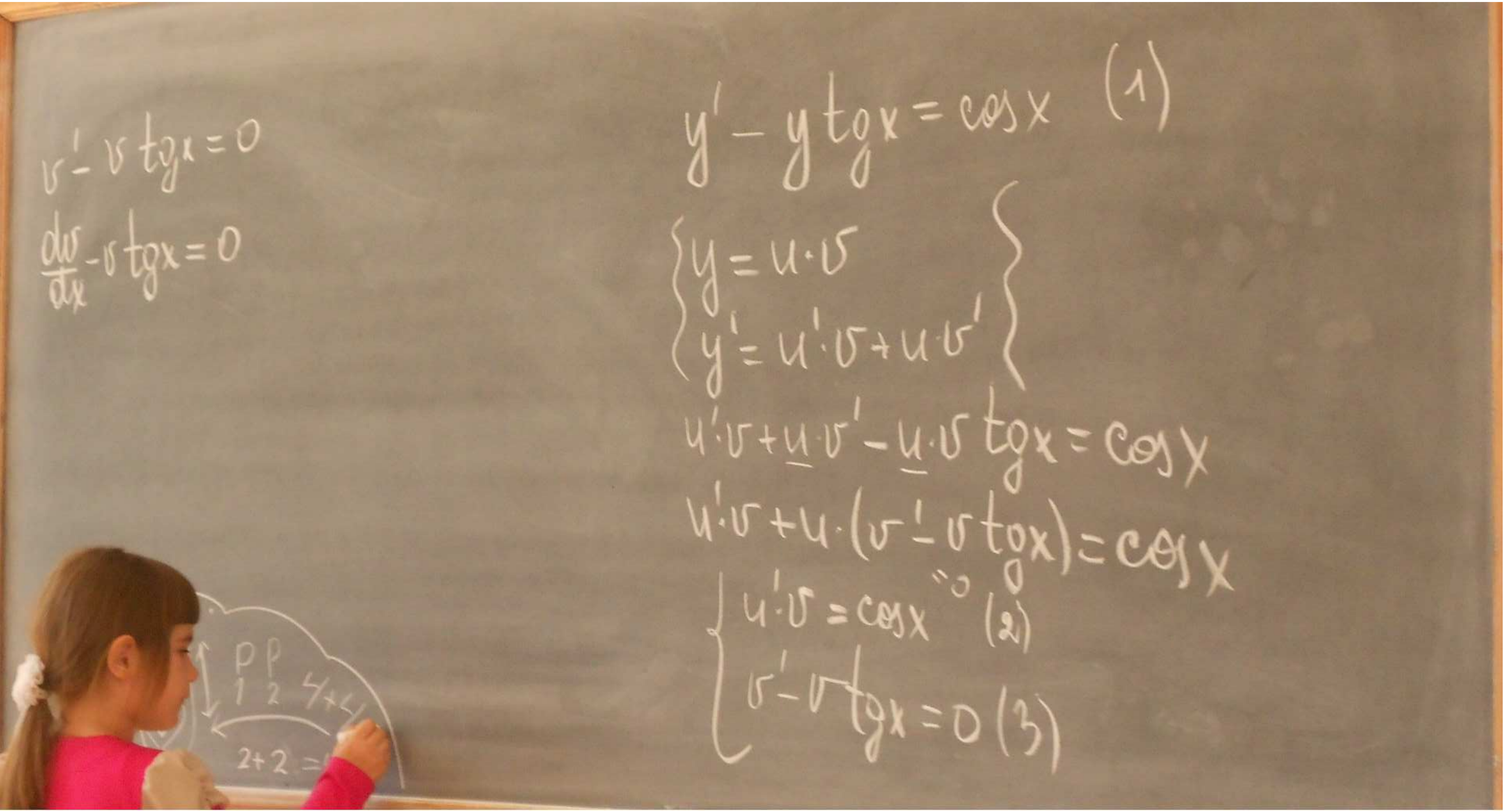
$$y' - y\,tg\,x = \cos x$$

$$\begin{cases} y = u \cdot v \\ y' = u' \cdot v + u \cdot v' \end{cases}$$

$$u' \cdot v + \underline{u} \cdot v' - \underline{u} \cdot v\,tg\,x = \cos x$$

$$u' \cdot v + u \cdot \overbrace{(v' - v\,tg\,x)}^{=0} = \cos x$$

$$\begin{cases} u' \cdot v = \cos x \\ v' - v\,tg\,x = 0 \end{cases}$$


y' – y tgx = cos x (1)
y = u·v
y' = u'·v + u·v'
u'·v + u·v' – u·v tgx = cos x
u'·v + u·(v' – v tgx) = cos x
u'·v = cos x (2)
v' – v tgx = 0 (3)
v' – v tgx = 0
dv/dx – v tgx = 0
2+2 =

$$y' - y\,\mathrm{tg}\,x = \cos x$$

$$\begin{cases} y = u\cdot v \\ y' = u'\cdot v + u\cdot v' \end{cases}$$

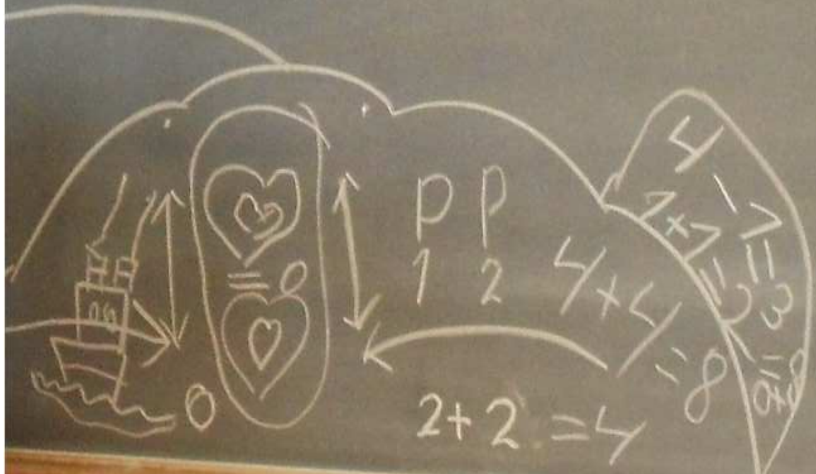
$$u'\cdot v + \underline{u}\cdot v' - \underline{u}\cdot v\,\mathrm{tg}\,x$$

$$u'\cdot v + u\cdot(v' - v\,\mathrm{tg}\,x)$$

$$\begin{cases} u'\cdot v = \cos x & (2) \\ v' - v\,\mathrm{tg}\,x = 0 & (3) \end{cases}$$

$$\frac{dv}{v} = \mathrm{tg}\,x\,dx$$

$$\int\frac{dv}{v} = \int \mathrm{tg}\,x\,dx$$



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$$\int \frac{dv}{v} = \int tgx\,dx$$

$$\ln|v| = \int \frac{\sin x}{\cos x}\,dx =$$

$$\frac{dv}{v} = tgx\,dx$$

$y' - y\,t$

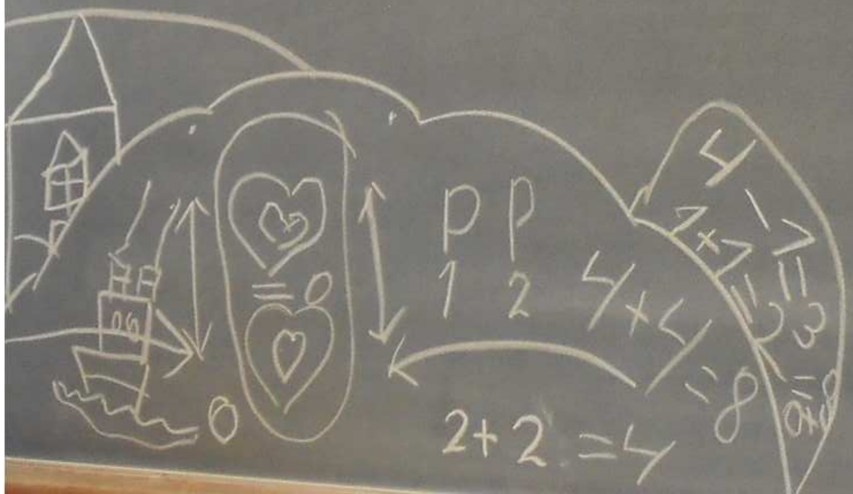
$$\begin{cases} y = u \cdot v \\ y' = u' \cdot v \end{cases}$$

$u' \cdot v + \underline{u} \cdot v$

$u' \cdot v + u \cdot$

$u' \cdot v =$

$u \cdot v'$



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$$\int \frac{dv}{v} = \int tg\,x\,dx$$

$$\ln|v| = \int \frac{\sin x}{\cos x}\,dx =$$

$$\int \frac{\sin x}{\cos x}\,dx = \left\{ \begin{array}{l} t = \cos x \\ dt = -\sin x\,dx \\ dx = \dfrac{dt}{-\sin x} \end{array} \right\}$$

$\ln|v| = \int \quad \cos x$

$$\int \frac{\sin x}{\cos x}\,dx = \left\{ \begin{array}{l} t = \cos x \\ dt = -\sin x\,dx \\ dx = \dfrac{dt}{-\sin x} \end{array} \right\} =$$

$$= \int \frac{\cancel{\sin x}}{t} \cdot \frac{dt}{-\cancel{\sin x}} = -\int \frac{dt}{t} = -\ln|t| + c =$$

$$= -\ln|\cos x| + C$$

$y = u$

$u' \cdot v + \underline{u}$

$u' \cdot v + u$

$\left\{ \begin{array}{l} u' \cdot v \\ v' - v \end{array} \right.$

$$y' - y\,tg\,x = \cos x$$

$$\begin{cases} y = u \cdot v \\ y' = u' \cdot v + u \cdot v' \end{cases}$$

$$u' \cdot v + \underline{u} \cdot v' - \underline{u} \cdot v\,tg\,x$$

$$u' \cdot v + u \cdot (\underbrace{v' - v\,tg\,x}_{=0})$$

$$\begin{cases} u' \cdot v = \cos x & (2) \\ v' - v\,tg\,x = 0 & (3) \end{cases}$$

$$= \int \frac{\cancel{\sin x}}{t} \cdot \frac{dt}{-\cancel{\sin x}} = -\int \frac{dt}{t} = -\ln|t| + c =$$

$$= -\ln|\cos x| + c$$

$$\ln|v| = -\ln|\cos x|$$

$$\ln|v| = \ln\left|\frac{1}{\cos x}\right|$$

$$v = \frac{1}{\cos x} \quad (*)$$

$$y' - y\,tg\,x = \cos x \quad (1)$$

$$\begin{cases} y = u \cdot v \\ y' = u' \cdot v + u v' \end{cases}$$

$$u' \cdot v + \underline{u} \cdot v' - \underline{u} \cdot v\,tg\,x = \cos$$

$$u' \cdot v + u \cdot (v' - v\,tg\,x) = \cos$$

$$\begin{cases} u' \cdot v = \cos x \quad (2) \\ v' - v\,tg\,x = 0 \quad (3) \end{cases}$$

$$\ln|v| = \ln\left|\frac{1}{\cos x}\right|$$

$$v = \frac{1}{\cos x} \quad (*)$$

$$u' \cdot \frac{1}{\cos x} = \cos x \;\Big|\cdot \cos x$$

$$\frac{du}{dx} = \cos^2 x$$

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$$\ln|v| = \ln\left|\frac{1}{\cos x}\right|$$

$$v = \frac{1}{\cos x} \quad (*)$$

$$u' \cdot \frac{1}{\cos x} = \cos x \quad \Big| \cdot \cos x$$

$$\frac{du}{dx} = \cos^2 x \quad \Big| \cdot dx$$

$$du = \cos^2 x \, dx$$

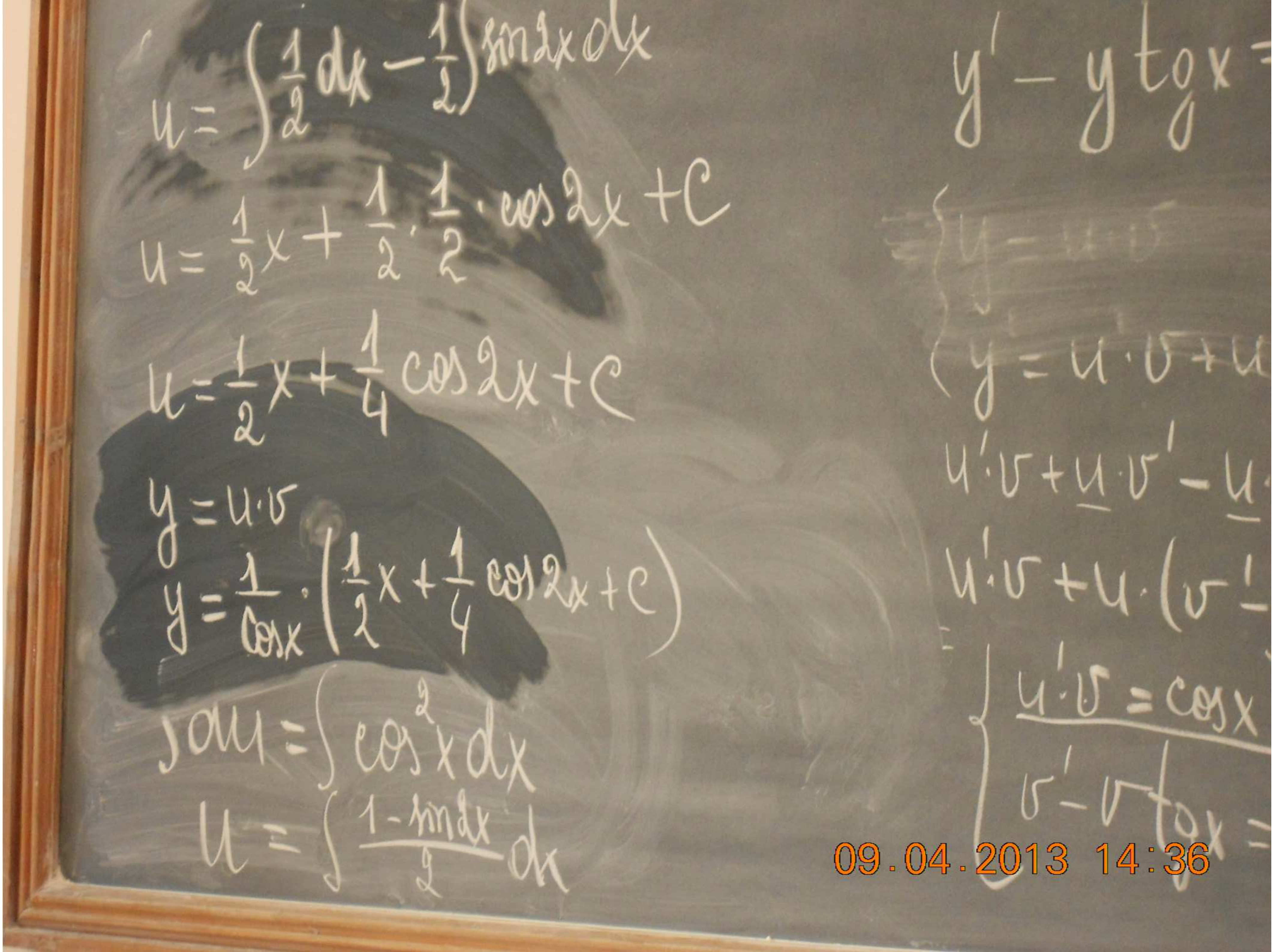
$$\int du = \int \cos^2 x \, dx$$

$$u =$$

$$u = \int \frac{1}{2}\,dx - \frac{1}{2}\int \sin 2x\,dx$$

$$u = \frac{1}{2}x + \frac{1}{2}\cdot\frac{1}{2}\cdot\cos 2x + C$$

$$u = \frac{1}{2}$$



$u = \int \frac{1}{2} dx - \frac{1}{2} \int \sin 2x \, dx$
$u = \frac{1}{2} x + \frac{1}{2} \cdot \frac{1}{2} \cdot \cos 2x + C$
$u = \frac{1}{2} x + \frac{1}{4} \cos 2x + C$
$y = u \cdot v$
$y = \frac{1}{\cos x} \cdot \left(\frac{1}{2} x + \frac{1}{4} \cos 2x + C \right)$
sau $= \int \cos^2 x \, dx$
$u = \int \frac{1 - \sin 2x}{2} dx$
$y' - y \, tg x =$
$y = u \cdot v + u$
$u' \cdot v + u \cdot v' - u$
$u' \cdot v + u \cdot (v'$
$u' \cdot v = \cos x$
$v' - v \, tg x =$
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$$u = \int \frac{1}{2}\,dx - \frac{1}{2}\int \sin 2x\,dx$$

$$u = \frac{1}{2}x + \frac{1}{2}\cdot\frac{1}{2}\cdot\cos 2x + C$$

$$u = \frac{1}{2}x + \frac{1}{4}\cos 2x + C$$

$$y = u \cdot v$$

$$\boxed{y = \frac{1}{\cos x}\cdot\left(\frac{1}{2}x + \frac{1}{4}\cos 2x + C\right)}$$

$$5 = \frac{1}{\cos 0}\left(\frac{1}{2}\cdot 0 + \frac{1}{4}\cdot\cos 0 + C\right)$$

$$\frac{1}{1}\left(0 + \frac{1}{4}\cdot 1 + C\right) = 5$$

$$\frac{1}{4} + C = 5 \Rightarrow C = 5 - \frac{1}{4} = \frac{19}{4} = 4\frac{3}{4}$$

$$\boxed{y = \frac{1}{\cos x}\left(\frac{1}{2}x + \frac{1}{4}\cos 2x + 4\frac{3}{4}\right)}$$

$$u = \int \frac{1}{2}\,dx - \frac{1}{2}\int \sin 2x\,dx$$

$$u = \frac{1}{2}x + \frac{1}{2}\cdot\frac{1}{2}\cdot\cos 2x + C$$

$$u = \frac{1}{2}x + \frac{1}{4}\cos 2x + C$$

$$y = u \cdot 15$$

$$\boxed{y = \frac{1}{\cos x}\cdot\left(\frac{1}{2}x + \frac{1}{4}\cos 2x + C\right)}$$

$$5 = \frac{1}{\cos 0}\left(\frac{1}{2}\cdot 0 + \frac{1}{4}\cdot\cos 0 + C\right)$$

$$\frac{1}{1}\left(0 + \frac{1}{4}\cdot 1 + C\right) = 5$$

$$\frac{1}{4} + C = 5 \Rightarrow C = 5 - \frac{1}{4} = \frac{19}{4} = 4\frac{3}{4}$$

$$\boxed{y = \frac{1}{\cos x}\left(\frac{1}{2}x + \frac{1}{4}\cos 2x + 4\frac{3}{4}\right)}$$

$$y = -2x^2 + 6x + 1 \qquad (5;2)$$

$$\boxed{y - y_0 = -\frac{1}{y'(x_0)}(x - x_0)}$$

$y = -2x^2 + 6x + 1 \quad (5;2) = (x_0; y_0)$

$$\boxed{y - y_0 = -\frac{1}{y'(x_0)}(x - x_0)}$$

$y' = (-2x^2 + 6x + 1)' = -4x + 6$

$y'(x_0) = y'(5) = -4 \cdot 5 + 6 = -14$

$y - 2 = -\frac{1}{-14}(x - 5)$

$y = \frac{1}{14}x - \frac{5}{14} + 2$

$y = \frac{1}{14}x + \frac{23}{14}$