Hour 12 scratch

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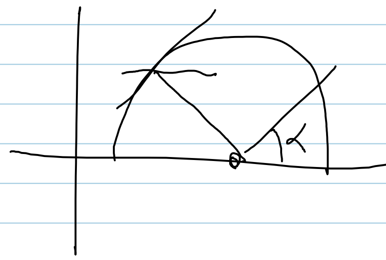
$$\frac{\sqrt{1+y'^2}}{y} \qquad F_y - \frac{d}{dx}F_{y'} : -\frac{\sqrt{1+y'^2}}{y^2} - \frac{d}{dx} \ldots$$

$$C = F - y'F_{y'} = \frac{\sqrt{1+y'^2}}{y} - y'\frac{y'}{y\sqrt{1+y'^2}}$$

$$= \frac{1}{y\sqrt{1+y'^2}}\left(1+y'^2 - y'^2\right)$$

$$y\sqrt{1+y'^2} = C$$



$$y^2(1+y'^2) = C$$

$$\sin\alpha \cdot \sqrt{1+\left(-\frac{1}{\tan\alpha}\right)^2} =$$

$$1+y'^2 = C/y^2$$

$$y'^2 = \frac{C}{y^2} - 1 \qquad \sin\alpha\sqrt{\frac{\sin^2 + \cos^2}{\sin^2}} = 1.$$

$$y' = \sqrt{\frac{C^2-y^2}{y^2}}$$

$$\sqrt{\frac{y^2}{C^2-y^2}}\,dy = dx \qquad \int\sqrt{\frac{(y/C)^2}{1-(y/C)^2}}\,dy = x + C_1$$

$$\int t\sqrt{\frac{1}{1-t^2}}\,dt \;\xrightarrow[2t\,dt = du]{t^2 = u}\; \frac{1}{2}\int du\sqrt{\frac{1}{1-u}} = \pm\sqrt{1-u}$$

$$(x-C_1)^2 + y^2 = C^2$$

$(x - c_1)\,dx + y\,dy = 0$

$\frac{dy}{dx} =$