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№3

y' - ?

$$\sin(3xy-7y)+\frac{x^2+3xy}{y^2}=2x+xy$$

$$\left(\sin(3xy-7y)+\frac{x^2+3xy}{y^2}\right)'_x=(2x+xy)'_x$$

$$(\sin(3xy-7y))'_x+\left(\frac{x^2+3xy}{y^2}\right)'_x=(2x)'_x+(xy)'_x$$

$$\cos(3xy-7y)\cdot(3xy-7y)'_x+\frac{(x^2+3xy)'_x\cdot y^2-(x^2+3xy)(y^2)'_x}{(y^2)^2}=$$

$$=2(x)'_x+(x)'_x y+x(y)'_x$$

$$\cos(3xy-7y)(3\cdot1\cdot y+3xy'-7y')+\frac{(2x+3\cdot1\cdot y+3x\cdot y')y^2-(x^2+3xy)2y\cdot y'}{y^4}=$$

$$=2+y+xy'$$

$$\cos(3xy-7y)(3x-7)y' + \frac{3xy^2-2yx^2-6xy^2}{y^2} \cdot y' - xy' = 21y - \cos(3xy-7y)\cdot 3y - \frac{(2x+3y)y^2}{y^4}$$

$$y' = \frac{21y - 3y\cdot\cos(3xy-7y) - ((2x+3y)/y^2)}{(3x-7)\cdot\cos(3xy-7y) - ((3xy+2x^2)/y) - x}$$

№4

dy - ?

$$y = \frac{(x^2+x+1)7^x}{(x^3-5)\ln x}$$

$$y' = \left(\frac{(x^2+x-1)7^x}{(x^3-5)\ln x}\right)' = \frac{((x^2+x+1)7^x)'\cdot(x^3-5)\ln x - (x^2+x+1)7^x((x^3-5)\ln x)'}{((x^3-5)\ln x)^2} =$$

$$= \frac{(((2x+1)7^x + (x^2+x+1)7^x\ln 7)(x^3-5)\ln x - (x^2+x+1)7^x(3x^2\ln x + (x^3-5)\cdot\frac{1}{x}))}{(x^3-5)^2\cdot\ln^2 x}$$

$$dy = \frac{((2x+1)7^x + (x^2+x+1)7^x\ln 7)(x^3-5)\ln x - (x^2+x+1)7^x(3x^2\ln x + (x^3-5)/x)}{(x^3-5)^2\cdot\ln^2 x}\,dx$$

№5

$dy,\ d^2y,\ d^3y$ - ?

1) $y = \sqrt[4]{x}\cdot\ln x$

$$y' = \frac{1}{4}\cdot x^{\frac{1}{4}-1}\cdot\ln x + \sqrt[4]{x}\cdot\frac{1}{x} = \frac{\ln x}{4\cdot\sqrt[4]{x^3}} + \frac{\sqrt[4]{x}}{x} = \frac{\ln x}{4\cdot\sqrt[4]{x^3}} + \frac{1}{\sqrt[4]{x^3}} = \frac{4+\ln x}{4\sqrt[4]{x^3}}$$

$$dy = \frac{4+\ln x}{4\sqrt[4]{x^3}}\,dx$$

$$y'' = \frac{1/x\cdot 4\cdot\sqrt[4]{x^3} - (4+\ln x)\cdot 4\cdot 3/4\cdot x^{\frac{3}{4}-1}}{16\cdot(x^{3/4})^2} = \frac{\frac{4\sqrt[4]{x^3}}{x} - \frac{3(4+\ln x)}{\sqrt[4]{x}}}{16\cdot x^{3/2}} =$$

$$= \frac{4-12-3\ln x}{16\,x^{1/4}\cdot x^{\frac{3}{2}}} = \frac{-8-3\ln x}{16\sqrt[4]{x^7}}$$

$$d^2y = \frac{-8-3\ln x}{16\sqrt[4]{x^7}}\,dx^2$$

$$y''' = \left(\frac{-8-3\ln x}{16\sqrt[4]{x^7}}\right)' = \frac{-3\cdot\frac{1}{x}\cdot 16\cdot x^{\frac{7}{4}} - (-8-3\ln x)\cdot 16\cdot\frac{7}{4}\cdot x^{\frac{7}{4}-1}}{256\cdot(x^{\frac{7}{4}})^2} =$$

$$= \frac{-48x^{\frac{3}{4}} + (8+3\ln x)\cdot 4\cdot 7\cdot x^{3/4}}{256\,x^{7/2}} = \frac{4x^{3/4}(-12+7(8+3\ln x))}{256\,x^{7/2}} =$$

$$= \frac{-12+7(8+3\ln x)}{64x^{11/4}} = \frac{-12+56+21\ln x}{64x^{11/4}} = \frac{44+21\ln x}{64x^{11/4}}$$

$$d^3y = \frac{44+21\cdot\ln x}{64\sqrt[4]{x^{11}}}\,dx^3$$