Exam FR

$\frac{3}{2}(xy)$

4b) $x^2+y^2=1-\frac{3xy}{2}$

(a) $\frac{dy}{dx}=?$

$$2x+2y\frac{dy}{dx}=0-\frac{3}{2}\left(x\cdot\frac{dy}{dx}+y\right)$$

$$2x+2y\frac{dy}{dx}=-\frac{3}{2}x\frac{dy}{dx}-\frac{3}{2}y$$

$$2y\frac{dy}{dx}+\frac{3}{2}x\frac{dy}{dx}=-\frac{3}{2}y-2x$$

$$\frac{dy}{dx}\left(2y+\frac{3}{2}x\right)=-\left(\frac{3}{2}y+2x\right)$$

$$\frac{dy}{dx}=-\frac{\frac{3}{2}y+2x}{2y+\frac{3}{2}x}$$

(b) what point : horizontal tangent line

$$0=\frac{3}{2}y+2x$$

$$\frac{2}{3}\cdot\frac{3}{2}y=-2x\cdot\frac{2}{3}$$

$$y=-\frac{4}{3}x$$

$$x^2+y^2=1-\frac{3}{2}xy$$

$$x^2+\left(-\frac{4}{3}x\right)^2=1-\frac{3}{2}x\cdot-\frac{4}{3}x^2$$

$$x^2+\frac{16}{9}x^2=1+2x^2$$

$$\frac{9}{9}x^2+\frac{16}{9}x^2-\frac{18}{9}x^2=1$$

$$\frac{43}{9}x^2=1$$

$$x^2=\frac{9}{43}\Rightarrow x=\pm\frac{3}{\sqrt{43}}$$

$$x^2+y^2=1-\frac{3}{2}xy$$

$$\frac{9}{43}+y^2=1-\frac{3}{2}\cdot\frac{3}{\sqrt{43}}y$$

$$y^2+\frac{9}{2\sqrt{43}}y-\frac{34}{43}=0$$

$y=$ ———

$$\frac{9}{43}+y^2=1-\frac{3}{2}\cdot\frac{-3}{\sqrt{43}}y$$

$$\frac{9}{43}+y^2=1+\frac{9}{2\sqrt{43}}y$$

$$y^2-\frac{9}{2\sqrt{43}}y-\frac{34}{43}=0$$

$y=$ ———

1a) $f(x)=(x\ln x)^{\tan^{-1}(x)}$, $=y$

$$\ln y=\ln(x\ln x)^{\tan^{-1}x}$$

$$\ln y=\tan^{-1}(x)\ln(x\ln x)$$

$$\frac{1}{y}\frac{dy}{dx}=\tan^{-1}(x)\cdot\frac{1}{x\ln x}\cdot\left[x\cdot\frac{1}{x}+\ln x\right]+\ln(x\ln x)\cdot\frac{1}{1+x^2}$$

$$\frac{1}{y}\frac{dy}{dx}=\frac{\tan^{-1}(x)}{x\ln x}(1+\ln x)+\frac{\ln(x\ln x)}{1+x^2}$$

$$\frac{dy}{dx}=y\left[\frac{\tan^{-1}(x)}{x\ln x}(1+\ln x)+\frac{\ln(x\ln x)}{1+x^2}\right]$$

$$\frac{dy}{dx}=(x\ln x)^{\tan^{-1}(x)}\left[\frac{\tan^{-1}(x)}{x\ln x}(1+\ln x)+\frac{\ln(x\ln x)}{1+x^2}\right]$$

Homework 15

2) $y = \frac{-4}{x-2}$

3 to 2.9

$dy = f'(x)\,dx$ $\qquad f'(x) = \frac{4}{(x-2)^2}$

$$dy = \frac{4}{(x-2)^2}\,dx$$

$$dy = \frac{4}{(x-2)^2}(-0.1)$$

$$dy = \frac{4}{(3-2)^2}(-0.1)$$

$$dy = \frac{4}{1}(-0.1)$$

$$dy = -0.4$$