Raaklyn met implisiete differensiasie

For each of the following equations, find the equation of the tangent line at the given point.

1	$x^2 - 3xy + y^2 = -1 \quad at\,(2,1)$	$y = \frac{1}{4}x + \frac{1}{2}$
2	$4x^2 + 9y^2 = 2 \quad at\,(\frac{1}{2},\frac{1}{3})$	$3y + 2x = 2$
3	$x\sqrt[3]{y} + y\sqrt[3]{x} = 10 \quad at\,(1,8)$	$y = -\frac{56}{13}x + \frac{160}{13}$
4	$(y-5)^5 = x^2 + 2xy - 33 \quad at\,(3,4)$	$y = -14x + 46$
5	$x\sin y + y\sin x = .7629 \quad at\,(\frac{\pi}{4},\frac{\pi}{6})$	See solution
6	$x^2e^y + y^2e^x = 2e \quad at\,(1,1)$	$y = -x + 2$
7	$e^{\sin x} + e^{\sin y} = 2 \quad at\,(0,\pi)$	$y = x + \pi$

Oplossing vraag 5

$$\begin{aligned} \sin y + x\cos y\frac{dy}{dx} + \sin x\frac{dy}{dx} + y\cos x &= 0 \\ \frac{dy}{dx}(x\cos y + \sin x) &= -\sin y - y\cos x \\ \frac{dy}{dx} &= \frac{-\sin y - y\cos x}{x\cos y + \sin x} \end{aligned}$$

Slope of the tangent line

$$\begin{aligned} \frac{dy}{dx} &= \frac{-\sin y - y\cos x}{x\cos y + \sin x} = \frac{-\sin(\frac{\pi}{6}) - (\frac{\pi}{6})\cos(\frac{\pi}{4})}{(\frac{\pi}{4})\cos(\frac{\pi}{6}) + \sin(\frac{\pi}{4})} \\ &= -.6273 \end{aligned}$$

The equation of the tangent line is:

$$\boldsymbol{y - 0.524 = -0.627\,(x - 0.785)}$$