AP Calculus AB – Worksheet 32 Implicit Differentiation

Find $\frac{dy}{dx}$.

1	$x^2y + xy^2 = 6$
2	$y^2 = \frac{x-1}{x+1}$
3	$x = \tan y$
4	$x + \sin y = xy$
5	$x^2 - xy = 5$
6	$y = x^{9/4}$
7	$y = \sqrt[3]{x}$
8	$y = (2x+5)^{-1/2}$

9	For $x^3 + y^3 = 18xy$, show that $\frac{dy}{dx} = \frac{6y - x^2}{y^2 - 6x}$
10	For $x^2 + y^2 = 13$, find the slope of the tangent line at the point $(-2,3)$.
11	For $x^2 + xy - y^2 = 1$, find the equations of the tangent lines at the point where $x = 2$.
12	For $x\sin 2y = y\cos 2x$, find the equations of the tangent and normal lines to the graph at the point $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$.
13	If $y' = (3x+1)^3$, find three possible equations for y.

Answers:

1) $\frac{dy}{dx} = -\frac{2xy + y^2}{2xy + x^2}$	2) $\frac{dy}{dx} = \frac{1}{y(x+1)^2}$	3) $\frac{dy}{dx} = \cos^2 y$
4) $\frac{dy}{dx} = \frac{1-y}{x - \cos y}$	5) $\frac{dy}{dx} = \frac{2x - y}{x}$	6) $\frac{dy}{dx} = \frac{9}{4}x^{\frac{5}{4}}$
7) $\frac{dy}{dx} = \frac{1}{3}x^{-\frac{2}{3}}$	8) $\frac{dy}{dx} = -(2x+5)^{-\frac{3}{2}}$	10) $\left.\frac{dy}{dx}\right\|_{(x,y)=(-2,3)} = \frac{2}{3}$
11) Tangents @ $(2,3)$: $y - 3 = \frac{7}{4}(x-2)$ @ $(2,-1)$: $y + 1 = -\frac{3}{4}(x-2)$	12) Tangent: $y - \frac{\pi}{2} = 2\left(x - \frac{\pi}{4}\right)$ Normal: $y - \frac{\pi}{2} = -\frac{1}{2}\left(x - \frac{\pi}{4}\right)$	