quiz 15
math1117.07
u new haven
f01nov

name: solution

1. For the following two equations, use implicit differentiation to find $\frac{dy}{dx}$. Then find the slope of the curve at the given point. *(4 points each)*

(a) $y^2 + 3x = 8$; $(1, \sqrt{5})$

(b) $(x+y)^{2/3} = y$; $(4,4)$

(a) $\frac{d}{dx}(y^2+3x) = \frac{d}{dx}(8)$

$2y\frac{dy}{dx} + 3 = 0$

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

@ $(1,\sqrt{5})$ $\quad \frac{dy}{dx} = -\frac{3}{2\sqrt{5}}$

(b) $\frac{d}{dx}\left((x+y)^{2/3}\right) = \frac{d}{dx}(y)$

$\frac{2}{3}(x+y)^{-1/3}\frac{d}{dx}(x+y) = \frac{dy}{dx}$

$\frac{2}{3}(x+y)^{-1/3}\left(1+\frac{dy}{dx}\right) = \frac{dy}{dx}$

$\frac{2}{3}(x+y)^{-1/3} = \frac{dy}{dx}\left(1-\frac{2}{3}(x+y)^{-1/3}\right)$

$\frac{dy}{dx} = \frac{\frac{2}{3}(x+y)^{-1/3}}{1-\frac{2}{3}(x+y)^{-1/3}}$

@ $(4,4)$

$\frac{dy}{dx} = \frac{\frac{2}{3}(4+4)^{-1/3}}{1-\frac{2}{3}(4+4)^{-1/3}}$

but $\frac{2}{3}(4+4)^{-1/3} = \frac{2}{3\sqrt[3]{8}} = \frac{1}{3}$

so $\frac{dy}{dx} = \frac{\frac{1}{3}}{1-\frac{1}{3}} = \frac{1}{2}$