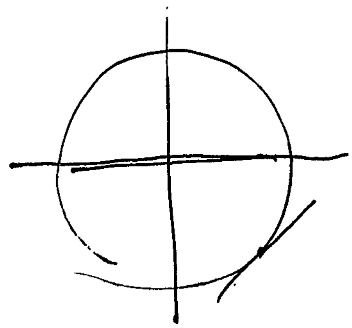

$x^2+y^2=1$

Could split

$y=\sqrt{1-x^2}$ $\quad$ $y=-\sqrt{1-x^2}$

Instead use Implicit differentiation ...

$$\frac{d}{dx}\left[x^2+y^2\right]=\frac{d}{dx}\left[1\right]$$

$$\cancel{2x+2y\frac{dy}{dx}}$$

$$\frac{d}{dx}\left[y^2\right]=\frac{d}{dx}\left[(y(x))^2\right]$$

$$\frac{d}{dx}\left[x^2\right]+\frac{d}{dx}\left[y^2\right]=\frac{d}{dx}\left[1\right]$$

really chain rule

$$2x+\frac{d(y^2)}{dx}\cdot\frac{dy}{dx}=0$$

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

$$\frac{dy}{dx}=\frac{-x}{y}$$

Ex. 1 $(x-y)^2 = x+y-1$

$$2(x-y)\cdot(1-y') = 1+y'$$

$$(2x-2y)\cdot(1-y') = 1+y'$$

$$\cancel{2x} - 2xy' - \cancel{2y} + 2yy' = 1 + \cancel{y'}$$

$$-\cancel{2x} \qquad +\cancel{2y} - y' \qquad -\cancel{y'} + 2y - 2x$$

$$-2xy' - y' + 2yy' = 1 + 2y - 2x$$

$$\frac{y'\cancel{(-2x-1+2y)}}{\cancel{(-2x-1+2y)}} = \frac{1+2y-2x}{(-2x-1+2y)}$$

$$y' = \frac{1+2y-2x}{-1+2y-2x}$$

Ex. 2 $x^2 + (y-x)^3 = 28$ Evaluate $\frac{dy}{dx}$ when $x=1$.

$$\cancel{2x} + 3(y-x)^2\cdot(y'-1) = 0$$

$$-\cancel{2x} \qquad\qquad -2x$$

$$\frac{\cancel{3(y-x)^2}\cdot(y'-1)}{\cancel{3(y-x)^2}} = \frac{-2x}{3(y-x)^2}$$

$$y' - \cancel{1} = \frac{-2x}{3(y-x)^2} + 1$$

$$+\cancel{1}$$

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

$$x^2 + (y-x)^3 = 28$$

$$1^2 + (y-1)^3 = 28$$

$$(y-1)^3 = 27$$

$$y-1 = 3$$

$$+1 \quad +1$$

$$y = 4$$

when $x=1$, $y=4$

$$y' = \frac{-2(1)}{3(4-1)^2} + 1 = \frac{-2}{27} + 1$$

$$\boxed{y'_{\text{when } x=1} = \frac{25}{27}}$$