Name . . . *Solution Key* . . . .
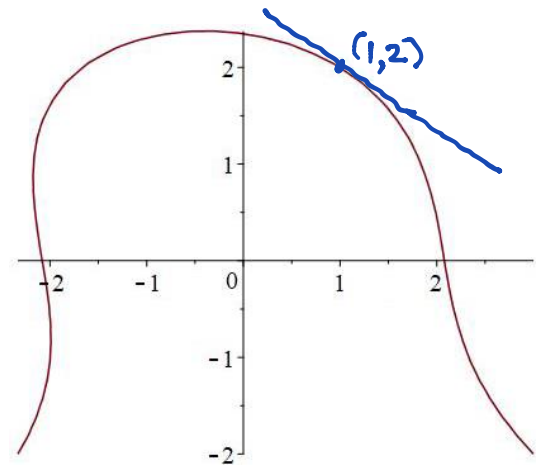
Quiz 6—Friday, March 13

A portion of the graph of the curve $xy + 3x^2 + y^3 = 13$ is shown below.

a) Check that the point $(1,2)$ lies on the curve. Also sketch the tangent line to the curve at $(1,2)$ on the graph provided.

$$1 \cdot 2 + 3 \cdot 1 + 2^3 = 13$$

So $(1,2)$ lies on the curve.

b) Find the slope of the tangent line to the curve at the point $(1,2)$.

$$\frac{d}{dx}(xy + 3x^2 + y^3) = \frac{d}{dx} 13$$

$$xy' + y + 6x + 3y^2 y' = 0 \qquad \text{where } y' = \frac{dy}{dx}$$

Evaluating at $(1,2)$, $\quad y' + 2 + 6 + 12y' = 0$

So $13y' + 8 = 0$ and $y' = -\frac{8}{13}$, the slope of the tangent line at $(1,2)$.

c) Find an equation for the tangent line to the curve at the point $(1,2)$.

$$y - 2 = -\frac{8}{13}(x-1), \quad \text{i.e. } y = -\frac{8}{13}x + \frac{34}{13} \quad \text{is the tangent line to the curve at } (1,2).$$