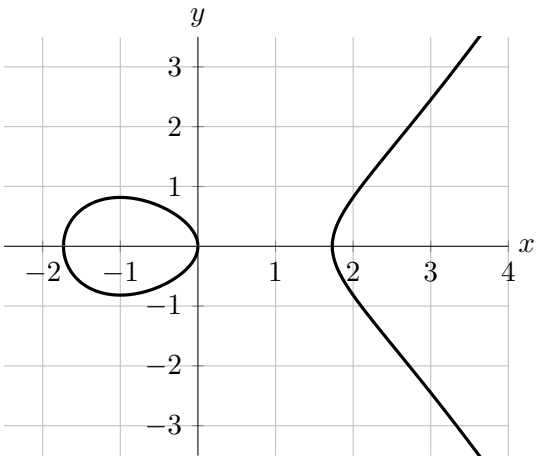
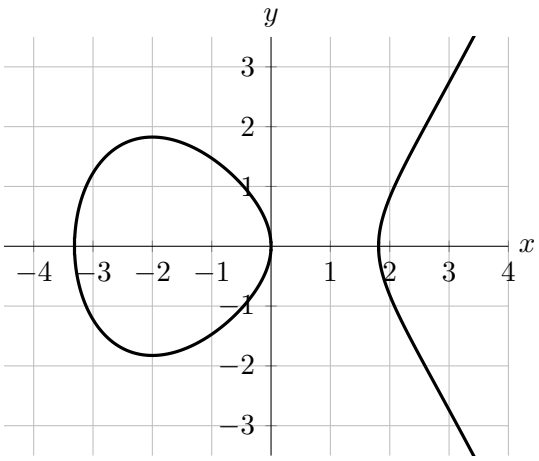
2. [12 points]

a. [6 points] Each the following is the graph of an implicit function.

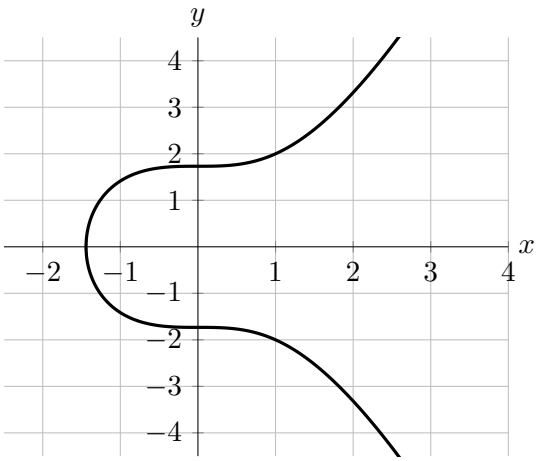
Graph I



Graph II



Graph III



Match each of the graphs above to the formula below that gives the slope at each point on the graph.

(A) $\dfrac{dy}{dx} = \dfrac{3x^2}{2y}$,

(B) $\dfrac{dy}{dx} = \dfrac{(x-1)(x+2)}{2y}$,

(C) $\dfrac{dy}{dx} = \dfrac{x^2-1}{2y}$,

(D) $\dfrac{dy}{dx} = \dfrac{(y-1)(y+2)}{2x}$.

You do not need to show work in this part.

Solution:

Answers: Graph I: **C** , Graph II: **B** , Graph III: **A**

b. [6 points] Find $\dfrac{dy}{dx}$ for the implicit function given by

$$2^{x+y} + \sin(x)\cos(y) = 5 - x.$$

Show all your work carefully to receive full credit.

Solution:

$$\frac{d}{dx}\left(2^{x+y} + \sin(x)\cos(y)\right) = \frac{d}{dx}(5 - x)$$

$$\ln(2)2^{x+y}\left(1 + \mathbf{\frac{dy}{dx}}\right) + \left(-\sin(x)\sin(y)\mathbf{\frac{dy}{dx}} + \cos(x)\cos(y)\right) = -1$$

$$\left(\ln(2)2^{x+y} - \sin(x)\sin(y)\right)\mathbf{\frac{dy}{dx}} + \ln(2)2^{x+y} + \cos(x)\cos(y) = -1$$

$$\left(\ln(2)2^{x+y} - \sin(x)\sin(y)\right)\mathbf{\frac{dy}{dx}} = -(1 + \ln(2)2^{x+y} + \cos(x)\cos(y))$$

Answer: $\dfrac{dy}{dx} = -\dfrac{1 + \ln(2)2^{x+y} + \cos(x)\cos(y)}{\ln(2)2^{x+y} - \sin(x)\sin(y)}$