6. [10 points] A manufacturer is constructing a closed hollow cylindrical tank out of a metal that costs $2 per square foot. (Note that the tank has both a bottom and a top made of this same metal.) The tank's top must also be coated with a chemical that costs $5 per square foot. The manufacturer will spend exactly $180 on the tank.

- Find the height and radius of the cylindrical tank, in feet, so that the tank has the maximum possible volume.
- What is the maximum volume in this case, in cubic feet?

In your solution, make sure to carefully define any variables and functions you use, use calculus to justify your answers, and show enough evidence that the values you find do in fact maximize the volume.

7. [4 points] A curve $\mathcal{C}$ gives y as an implicit function of x and satisfies

$$\frac{dy}{dx} = \frac{2xy}{3y^2 - x^2} \quad \text{which can be factored and rewritten as} \quad \frac{dy}{dx} = \frac{2xy}{(\sqrt{3}y - x)(\sqrt{3}y + x)}.$$

One of the following graphs is the graph of the curve $\mathcal{C}$. Write the letter corresponding to that graph.

Hint: Look for horizontal and vertical tangent lines.

A.

B.

C.

D.