9. [9 points] Let \( C \) be the curve given by the equation \( y^2 + 3x = x^3 + 3 \). The graph of \( C \) is shown below.

Note that \( \frac{dy}{dx} = \frac{3x^2 - 3}{2y} \). You must show all of your work in this problem.

a. [2 points] Find the coordinates of the point \( P \).

\[ \text{Solution: } y^2 + 3(0) = 0^3 + 3, \text{ so } (0, -\sqrt{3}) \]

b. [3 points] The point \((-2, 1)\) is on the curve \( C \). Find the equation of the tangent line to the curve \( C \) at this point.

\[ \text{Solution: } \text{Since the slope at this point is } \frac{dy}{dx} = \frac{3(-2)^2 - 3}{2(1)} = \frac{9}{2}, \text{ the tangent line is } y = 1 + \frac{9}{2}(x + 2). \]

c. [4 points] Find all points on the curve \( C \) where the tangent line is horizontal. Give your answer as a list of ordered pairs. Write NONE if there are no such points.

\[ \text{Solution: } \text{To find where the tangent line is horizontal, set } 3x^2 - 3 = 0 \text{ to find } x = \pm 1. \]

When \( x = 1 \), we find \( y^2 + 3(1) = (1)^3 + 3 \), or \( y^2 = 1 \), so \( y = \pm 1 \).

This leads to the points \((1, 1)\) and \((1, -1)\).

When \( x = -1 \), we find \( y^2 + 3(-1) = (-1)^3 + 3 \), or \( y^2 = 5 \), so \( y = \pm \sqrt{5} \).

This leads to the points \((-1, \sqrt{5})\), and \((-1, -\sqrt{5})\).