3. [7 points] Consider the curve \( D \) defined by the equation
\[ x^2y(1-y) = 9. \]

Note that the curve \( D \) satisfies
\[ \frac{dy}{dx} = \frac{2xy(y-1)}{x^2(1-2y)}. \]

a. [4 points] Exactly one of the following points \((x, y)\) lies on the curve \( D \).
Circle that one point.

\[(0.9, 10) \quad (1, -8) \quad (3, 9) \quad (9, 3) \quad (10, 0.9)\]

Then find an equation for the tangent line to the curve \( D \) at the point you chose.

**Solution:** At the point \((0.9, 10)\), the slope of the tangent line is
\[
\frac{2 \cdot 10 \cdot 0.9 \cdot (0.9 - 1)}{100 \cdot (1 - 2 \cdot 0.9)} = \frac{1.8}{80} = \frac{9}{400} = 0.0225.
\]

**Answer:**
\[ y = 0.9 + \frac{1.8}{80}(x - 10) \quad (\approx 0.625 + 0.0225x) \]

b. [3 points] Find all points on the curve \( D \) where the slope of the curve is undefined. Give your answers as ordered pairs. Write NONE if there are no such points.

**Solution:** The slope is undefined for points on \( D \) when the denominator of \( \frac{dy}{dx} \) is 0. This happens when \( x^2(1-2y) = 0 \), so \( x = 0 \) or \( y = \frac{1}{2} \).

When \( x = 0 \), we know that \( x^2y(1-y) = 0 \) (rather than 9), so there are no such points on the curve \( D \).

When \( y = \frac{1}{2} \), the equation for the curve gives \( x^2 \cdot \frac{1}{2}(1 - \frac{1}{2}) = 9 \). So \( x^2 = 36 \) and therefore \( x = \pm 6 \). This results in the two points \((6, \frac{1}{2})\) and \((-6, \frac{1}{2})\).

**Answer:** \((x, y) = (6, \frac{1}{2}), (-6, \frac{1}{2})\)