Prob 1: If \( f(x) = x^3 + x \), find the number \( c \) promised by MVT on the interval \([1, 2]\).

Note: \( f \) is differentiable everywhere, so MVT applies.

\( f \) is a polynomial.

\[
f'(c) = \frac{f(2) - f(1)}{2 - 1} = \frac{10 - 2}{2 - 1} = 8
\]

\[
f'(x) = 3x^2 + 1 \quad f'(c) = 3c^2 + 1 = 8
\]

\[
3c^2 = 7
\]

\[
c = \sqrt{\frac{7}{3}}
\]

Prob 2: Find the slope of the tangent line to \( x^3 + y^3 = x + y + 6 \) at \((1, 2)\).

\[
3x^2 + 3y^2 y' = 1 + y'
\]

\[
3 \cdot 1^2 + 3 \cdot 2^2 y' = 1 + y'
\]

\[
3 + 12y' = 1 + y'
\]

\[
y' = -2
\]

\[
y' = -\frac{2}{11}
\]

\[
(y - 2) = -\frac{2}{11} (x - 1)
\]