1 (8 pts) Answer the following questions.

(5 pts) 1.1 Find the slope \( m \) of the tangent line to the curve \( y = \frac{3e^x + x^3}{x} \) at \( x = 1 \).

\[
y'(x) = \frac{L \text{d} H - H \text{d} L}{L^2} = \frac{x(3e^x + 3x^2) - (3e^x + x^3)}{x^2} = \frac{3xe^x + 3x^3 - 3e^x - x^3}{x^2} = \frac{3xe^x - 3e^x + 2x}{x^2}
\]

\[
y'(1) = \frac{3e - 3e + 2}{1} = \frac{2}{1} = 2
\]

(3 pts) 1.2 Use \( m \) from 1.1 to find the equation of the tangent line at \( x = 1 \).

\[
y - y_1 = m(x - x_1)
\]

\[
m = 2
\]

\[
(x_1, y_1) = (1, \frac{3e + 1}{1}) = (1, 3e + 1)
\]

\[
y - (3e + 1) = 2(x - 1) \rightarrow y = 2x - 2 + 3e + 1
\]

2 (2 pts) Let \( P(x) = F(x)G(x) \) where \( F \) and \( G \) are the function whose graph are shown below.

Find \( P'(2) \)

\[
P'(x) = F(x)G'(x) + F'(x)G(x)
\]

\[
P'(2) = F(2)G'(2) + F'(2)G(2)
\]

\[
= 3 \cdot \frac{1}{2} + 0 \cdot 2 = \frac{3}{2}
\]