

Find the derivatives of the following functions:

1. $f(x) = \frac{x^3 - \ln(x)}{1 - x^2} + \frac{2}{x^2},$

2. $f(x) = \frac{x^2 - e^{-x}}{3x + 1} + xe^{-x},$

3. $f(x) = \frac{\sqrt{x}}{2 + x} - \frac{1}{e^{3x}},$

4. $f(x) = \frac{8e^{-2x}}{12 + \cos(2x)}.$

Find the derivative of the following functions. Find the x and y -intercepts and any asymptotes if they exist. Find the critical points and determine if they are relative maxima or minima for each graph. You should sketch the curves of the functions.

5. $y = \frac{x^2}{x + 1},$

6. $y = \frac{e^x}{x + 1},$

7. $y = \frac{x^2 - 2x + 2}{x - 1}.$