Problem 1. Sketch the function

\[ f(x) = \begin{cases} 
  e^x & x < 0 \\
  \frac{x^2+3}{5(x+1)} & x \geq 0 
\end{cases} \]

In particular, determine (i) the intercepts with the coordinate axes, (ii) all horizontal and vertical asymptotes, (iii) its continuity and differentiability, (iv) the intervals of increase and decrease, (v) the intervals of convexity and concavity, (vi) all local and global extrema.

Problem 2. Evaluate the following limit:

\[ \lim_{x \to \infty} \left( \sqrt{3x^2 + 1} - \sqrt{3x^2 - 2x} \right). \]