Example 1: Case 1-rarefaction and 2-rarefaction. Depiction of the exact solution at $t = 1$ for the initial Riemann problem:

$$\mathbf{u} = (\rho, I)_{|t=0} = \begin{cases} (0.8, -0.2), & \text{if } x < 0, \\ (0.4, 0.3), & \text{if } x > 0. \end{cases}$$

Solution computed using $N = 500$ discretization points on $x = [-1, 1]$ interval.