Consider the following conservation laws:

\[ u_t + [f(u)]_x = 0, \]

and its approximation:

\[ Q_{i+1}^n = Q_i^n - \frac{\Delta t}{\Delta x} \left( F_{i+1/2}^n - F_{i-1/2}^n \right), \]

where

\[ F_{i-1/2}^n \approx \frac{1}{\Delta t} \int_{t^n}^{t^{n+1}} f(u(x_{i-1/2}, t)) dt, \]

and

\[ Q_i^n = \frac{1}{\Delta x} \int_{x_{i-1/2}}^{x_{i+1/2}} u(x, t^n) dx, \]

Suppose that \( f'' < 0 \). Write down an expression for \( F_{i-1/2}^n \) and explain your choice by referring to the characteristic curves.