AP Calculus Free Response: Motion

*This problem is intended to be solved* ***without*** *the use of a calculator.*

Two particles move along the x-axis. For , the position of particle  at time  is given by , while the position of particle  at time  is given by .

**(a)** For , find all times  during which particle  is moving to the left. Explain your reasoning.

**(b)** For , find all times  during which the two particles travel in the same direction. Explain your reasoning.

**(c)** Find the acceleration of particle  at time . Is particle  speeding up, slowing down, or doing neither at time ? Explain your reasoning.