For small, slowly falling objects, the assumption made in the text that the drag force is proportional to the velocity is a good one. For larger, more rapidly falling objects, it is more accurate to assume that the drag force is proportional to the square of the velocity.²

(a) Write a differential equation for the velocity of a falling object of mass \( m \) if the drag force is proportional to the square of the velocity.

(b) Determine the limiting velocity after a long time.