Challenge Problem 17

N women, each of mass m, stand on a railway flatcar of mass M. They jump off one end of the flatcar with velocity u relative to the car. The car rolls in the opposite direction without friction.

(a) What is the final velocity of the flatcar if all the women jump at the same time?

(b) What is the final velocity of the flatcar if the women jump off one at a time?

(c) Which answer, either (a) or (b), is greater? Try to make physical and/or intuitive sense of this answer and comment on your thoughts.