Computer Demonstrations

To Catch or Not to Catch!

f	n_a	n_s	$(v_s-v_a)/v_a$*	Outcome
0.05	1	1	-0.0175475	*catch*
0.05	1	2	-0.402192	*reentry*
0.05	1	3	No solution (a<R/2)	
0.05			-1.0	*radial infall*
0.05			+0.164	*"close call"*
0.05			+0.42	*escape!*

* v_S is the speed of the sandwich at the moment of release. v_a is the speed of the astronauts in their circular orbits. Thus v_S-v_a is the speed of the sandwich relative to Peter's motion. If $v_S-v_a > 0$, Peter will have to throw the sandwich "forward" (i.e., in the direction of his motion), if it is < 0 he will have to throw it "backwards".
The ratio $(v_S-v_a)/v_a = v_S/v_a - 1$ is independent of the Gravitational constant G, of the orbital radius R, and independent of the Mass of the Earth. *Show that this is true.*