Present neatly on ~~separate paper~~. Justify for full credit. No Calculators.

Name _____     Score _____ 8 minutes / A

1)

Suppose that the position functions of two particles, $P_1$ and $P_2$, in motion along the same line are

$$s_1 = \tfrac{1}{2}t^2 - t + 3 \quad \text{and} \quad s_2 = -\tfrac{1}{4}t^2 + t + 1$$

respectively, for $t \geq 0$.

(a) Prove that $P_1$ and $P_2$ do not collide.

(b) How close do $P_1$ and $P_2$ get to each other?

(c) During what intervals of time are they moving in opposite directions?

Let $s_A = 15t^2 + 10t + 20$ and $s_B = 5t^2 + 40t$, $t \geq 0$, be
the position functions of cars $A$ and $B$ that are moving along
parallel straight lanes of a highway.
(a) How far is car $A$ ahead of car $B$ when $t = 0$?
(b) At what instants of time are the cars next to each other?
(c) At what instant of time do they have the same velocity?
    Which car is ahead at this instant?