

# Math 251 Workshop Problems, Spring 2009, Set 3

Due Tuesday, May 19

1. Two particles  $P_1$  and  $P_2$  move along the  $s$ -axis starting at time  $t = 0$ . Their respective position functions are  $s_1(t) = 8e^{2t} - e^{4t}$  and  $s_2(t) = \sin^2 2t - \sin^2 t$ .

(a) Find on your calculator a numerical approximation for the time and place at which they (first) collide. Is it a head-on collision?

(b) Find the time and place at which  $P_1$  changes direction for the first time. Give exact answers (in terms of  $\pi$ ,  $e$ , square roots, logs, etc.) and also give 2-place decimal approximations.

(c) EXTRA CREDIT: Do the same for  $P_2$ .