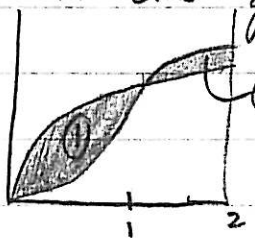
Written Problem # 5 6-1; 45

#45 a) The car that is ahead after one minute is car A because it has been traveling at a higher velocity than car B between the interval from 0 to 1; [0, 1]. When they reach 1 min the velocities of car A + Car B are equal but the distance traveled is not. Car A has traveled further because its velocity has been greater than car B. ✓

b) The area of the shaded region represents the distance between the two cars — shows how far ahead car A is of car B. ✓

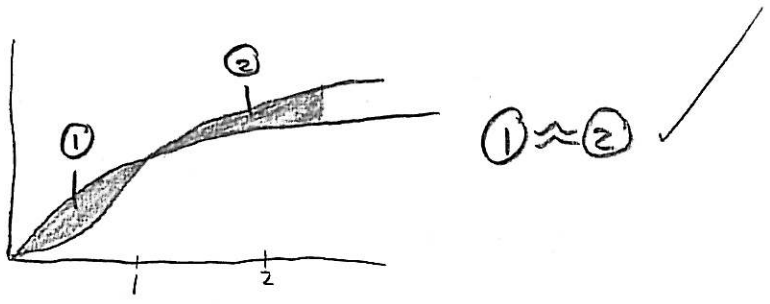
$\int$ function of car A − function of car B = A
(velocity) (velocity)

c) Car A is still ahead of car B after two minutes. You must "eye" the fact that the Area between the curves of the shaded region when car A has the greater velocity is larger than the area when car B has the greater velocity. ✓



① > ②

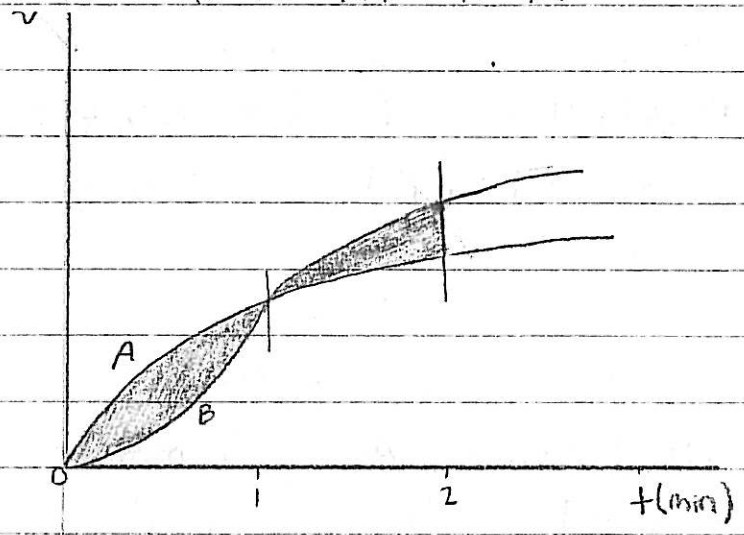
d) I would say that the cars are side by side again at 2.25 min. I did this by trying to judge when the areas between the curves of [0,1] would equal ≈ [1, 2.25].



2/5/08

Written Problem 5-

We are given the graphs of the velocity functions of car A and car B.



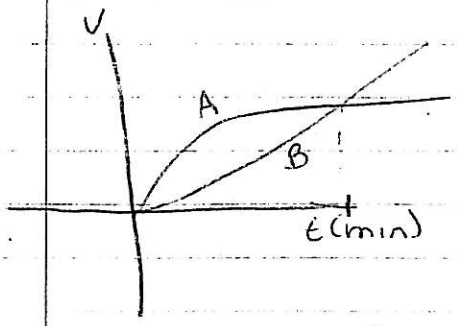
a) The velocity of car A is greater than the velocity of car B from 0 min to 1 min. This is shown by curve A being above curve B from 0 to 1. Therefore, car A has gone a greater distance in one minute than car B. Car A is ahead after one minute.

b) The area of the shaded region represents the distance between car A and car B after one minute. More specifically, it represents the distance car A is ahead of car B after one minute. (The area under A from 0 to 1 minus the area under B from 0 to 1).

c) After two minutes, car A is still ahead. As represented by the second shaded area, we can see that the first shaded area is greater. The second shaded area represents the distance car B has made up on car A. ✓ Because the first shaded area (0 to 1) is greater than the second shaded area (1 to 2), car B has not yet caught up to car A. ✓

d) We can estimate the time at which the cars are again side by side. After 2 minutes, car A is slightly ahead of Car B. Car B continues to have a greater velocity than Car A after 2 minutes. Therefore, in just a short period of time, approximately .25 minutes, car B will catch up to car A. At around 2.25 minutes, the cars are again side by side. ✓

45) Two cars, A and B, start side by side and accelerate from rest.



a) Which car is ahead after one minute?

The area under the curves A and B represent the distance covered by the cars. Because curve a is above curve B, it has a larger area so it has covered more distance car B. The reason the lines intersect at 1 minute is because they are traveling at the same velocity but after 1 minute, Car A has still covered more distance than car B.

b) What is the meaning of the area of the shaded region?

The shaded region represents the distance that car A is ahead of car B. It's the difference of the distance covered by car B from Car A.