8. [7 points] Mr. R. DeVark discovers that there is a loud humming sound emanating from a tree in his backyard. The volume of the sound at any point in the yard is a function of the point's distance from the tree.

- Let $V(x)$ be the rate of change (in decibels per meter) of the volume of the sound where x is the distance (in meters) from the tree.
- Let $K(t)$ be the distance, in meters, of Mr. DeVark from the tree t seconds after he first notices the sound.

Assume that K is invertible and that V, K, and K^{-1} are differentiable.

a. [3 points] Give a practical interpretation of the equation $\displaystyle\int_{10}^{40} V(x)\, dx = -5$ in the context of this problem. *Remember to use a complete sentence and include units.*

b. [2 points] Which one of the following expressions represents the instantaneous rate of change (in decibels per second) of the volume at which Mr. DeVark hears the sound 30 seconds after he first notices the sound? Circle the <u>one</u> best answer.

$V(30)$	$V(30)K(30)$	$V'(30)K(30)$
$V'(30)$	$V(30)K'(30)$	$V'(30)K'(30)$
$V(K(30))$		
$V(K'(30))$	$V(K(30))K(30)$	$V'(K(30))K(30)$
$V'(K(30))$	$V(K(30))K'(30)$	$V'(K(30))K'(30)$
$V'(K'(30))$	$V(K'(30))K'(30)$	$V'(K'(30))K'(30)$

c. [2 points] Which of the following is the best interpretation of the equation $(K^{-1})'(15) = -2$? Circle the <u>one</u> best answer.

   i. Between 15 and 15.5 seconds after Mr. DeVark notices the humming sound, he moves about 1 meter closer to the tree.

   ii. It takes about 1 second for Mr. DeVark to go from being 15 meters away from the tree to 14.5 meters away from the tree.

   iii. The volume of the humming sound is about 1 decibel lower at a point 15.5 meters from the tree than it is at a point 15 meters from the tree.

   iv. When Mr. DeVark is 15 meters away from the tree, it is about 2 seconds before he notices the humming sound

   v. The volume of the humming sound Mr. DeVark hears is about 1 decibel lower 15 seconds after he first notices it than 0.5 seconds later.

   vi. When Mr. DeVark is 15 meters away from the tree, he moves about 2 meters closer to the tree in the next second.