**P2.5-2)** A train starts from rest and travels along a straight track. The train accelerates from $v_o = 0$ with a constant acceleration a_A until it reaches a maximum velocity of v_{max}. It then continues with constant speed for a time and then decelerates with a constant deceleration of a_C until it stops. Prove that the total time the train travels is equal to $t_{total} = (s_{total} / v_{max}) + (v_{max} / 2)((1/a_C) + (1/a_A))$, where s_{total} is the total distance traveled by the train.

Given:

Prove: $t_{total} = (s_{total} / v_{max}) + (v_{max} / 2)((1/a_C) + (1/a_A))$

Solution:

Plot the velocity of the train.

$v(t)$
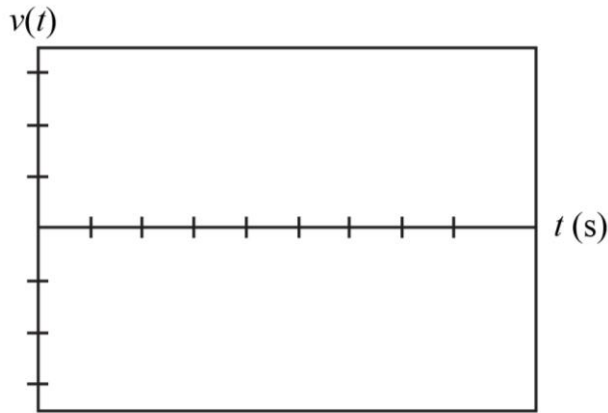
Use the graphical method to prove that
$t_{total} = (s_{total} / v_{max}) + (v_{max} / 2)((1/a_C) + (1/a_A))$

$t_{total} = $ _____