

Name:

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Instructions: Though calculators can be used for the entire daily question, all problems require you to show your work. Any answer without proper justification will receive **ZERO** credit. Only **EXACT** answers will receive full credit unless otherwise noted.

1. The position of a vehicle for any time, $t \geq 0$, is given by $s(t) = e^t \cos(t) - 5t^2 + 7$.

a) Determine the function that models the vehicle's velocity for $t \geq 0$.

$$V(t) = e^t(-\sin(t)) + e^t(\cos(t)) - 10t$$

$$V(t) = -e^t \sin(t) + e^t \cos(t) - 10t$$

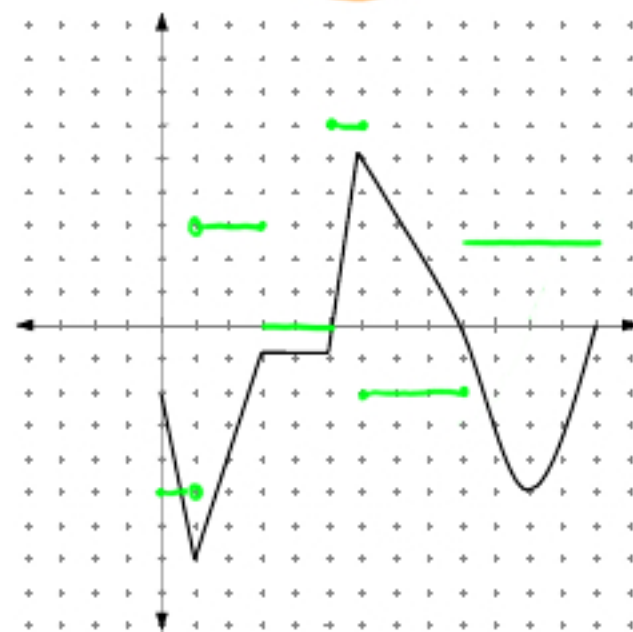
b) Determine the function that models the vehicle's acceleration for $t \geq 0$.

$$a(t) = (-e^t)(\cos(t)) + (\sin(t))(-e^t) + (e^t)(-\sin(t)) + (\cos(t))(e^t) - 10$$

$$a(t) = -\cancel{e^t \cos(t)} - e^t \sin(t) - e^t \sin(t) + \cancel{e^t \cos(t)} - 10$$

$$a(t) = -2e^t \sin(t) - 10$$

2. Given the graph of a particle's **VELOCITY** (m/sec) at time t (secs), determine each of the following:.



{Scale is 1 tick mark = 1 unit}

This is the VELOCITY GRAPH!

It is not, I repeat, IS NOT, the position graph!

$a(t)$

- a) When is the particle moving to the left?

$$[0, 5) \cup (9, 13]$$

- b) When is the particle moving to the right?

$$(5, 9)$$

- c) When is the particle at rest?

$$x = 5, 9$$

- d) When is the particle slowing down?

$$(1, 2), (5, \sim 5.1), (6, 9), (11, 13)$$

- e) When is particle speeding up?

$$[0, 1), (\sim 5.1, 6), (9, 11)$$

- f) When is the particle traveling at a constant velocity?

$$(3, 5)$$

- g) When is the speed of the particle the greatest?

$$x = 1$$

- h) When is the velocity of the particle the greatest?

$$x = 6$$