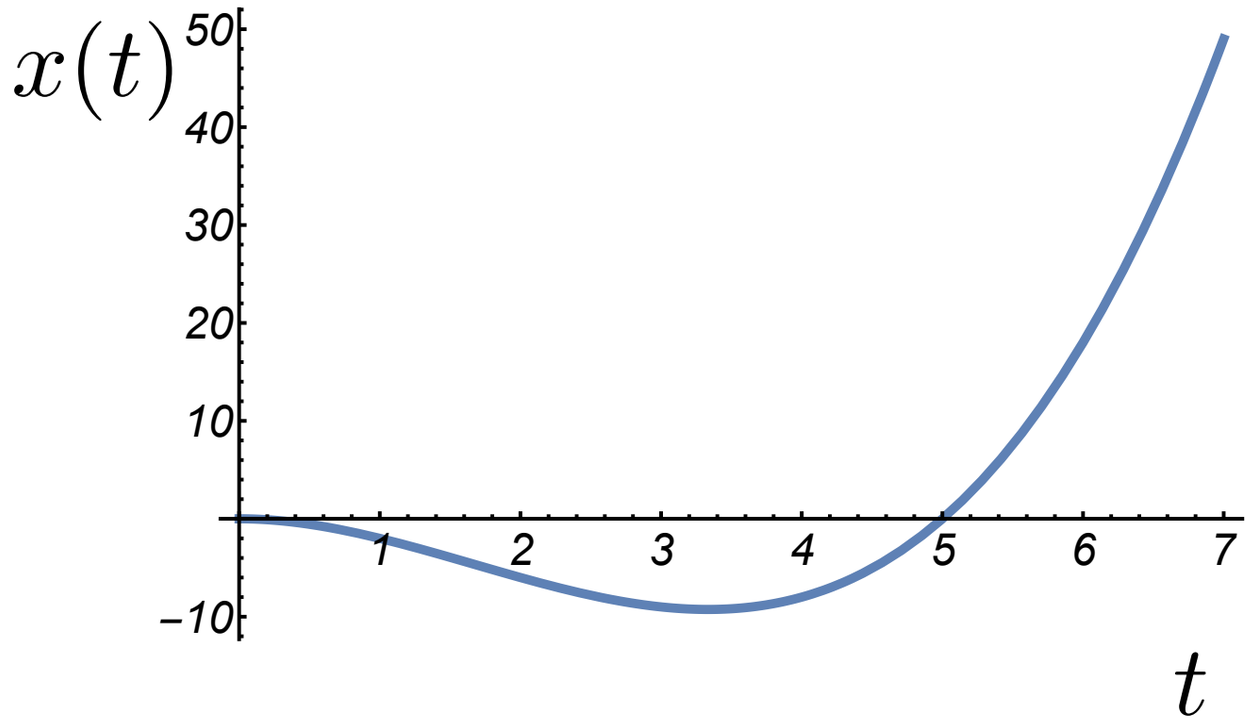
Fun Physics Fact of the Day

At higher elevations, atmospheric pressure drops and the temperature at which water boils drops with it. This means that you will need to cook your food longer to achieve the same results as at lower elevation.

The Derivative

$$x(t) = \frac{1}{2}t^3 - \frac{5}{2}t^2$$



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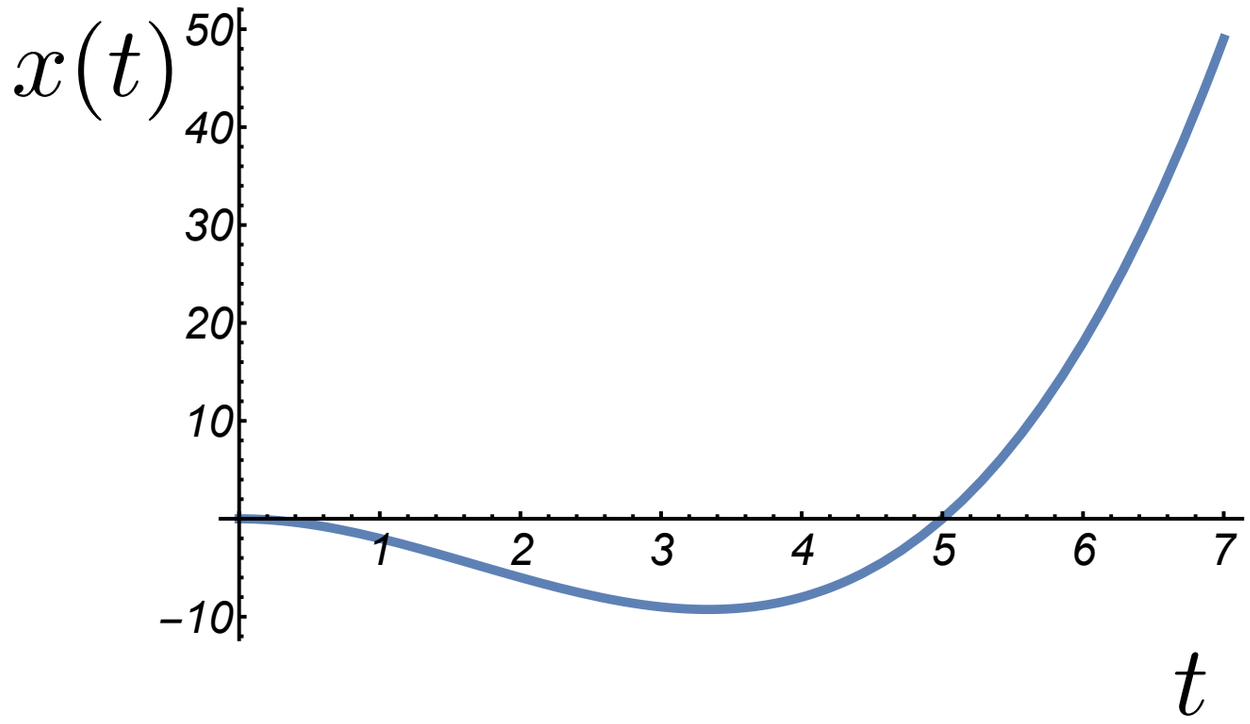
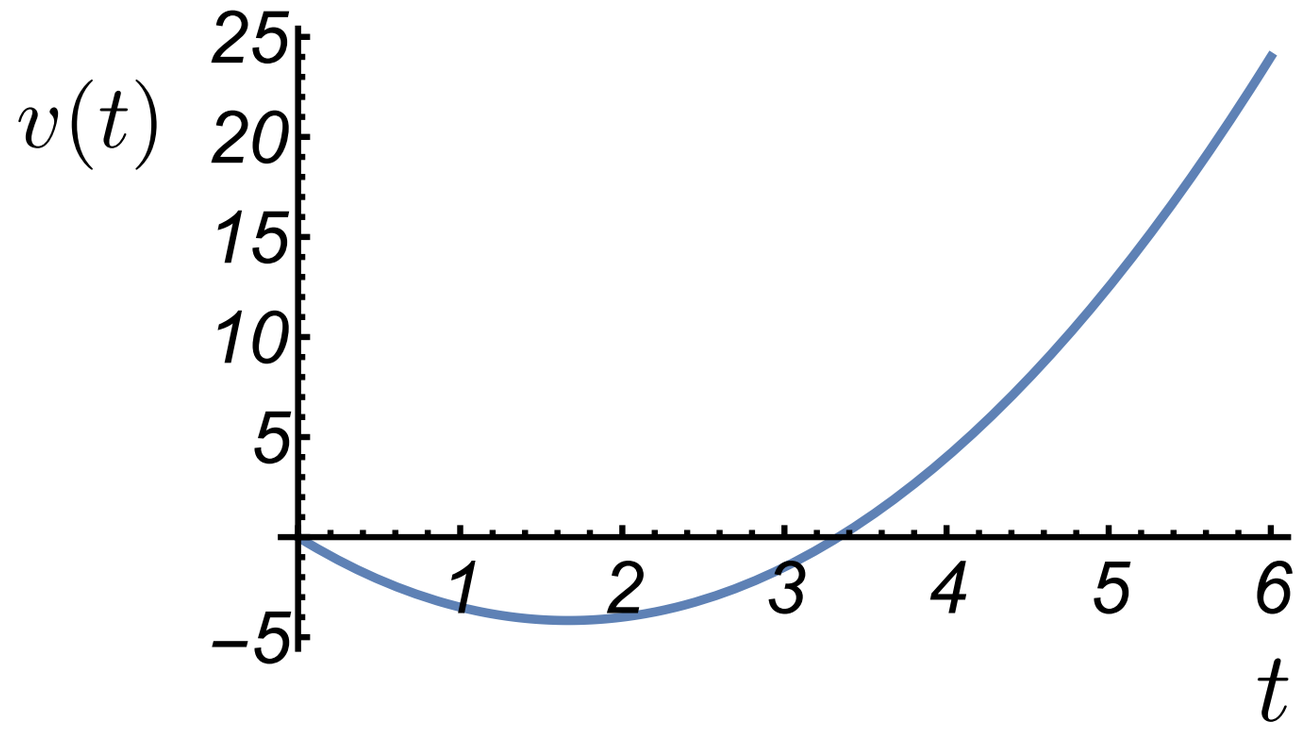
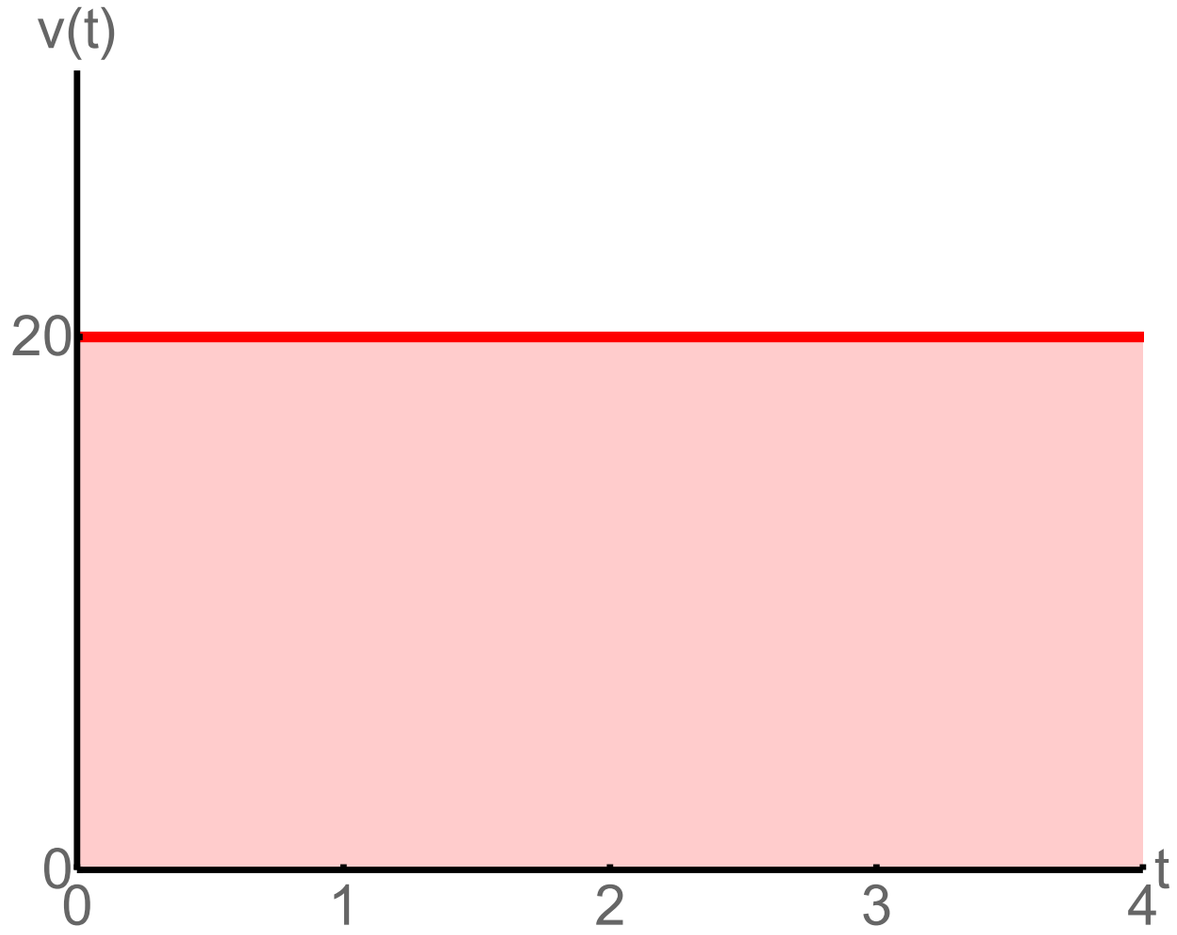


$$v(t) = \frac{3}{2}t^2 - 5t$$

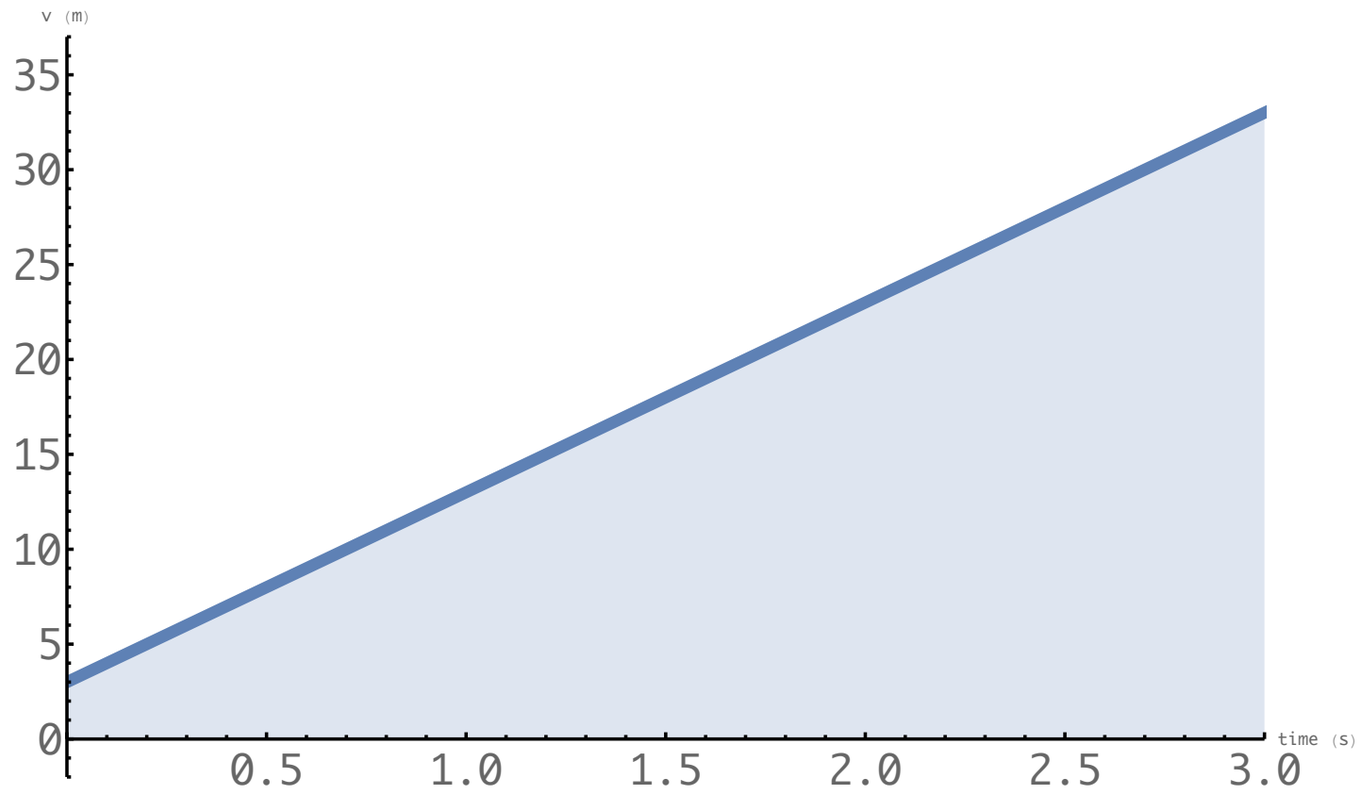


Finding Position from Velocity



$$s_f = s_i + v_s \Delta t$$

Finding Position from Velocity



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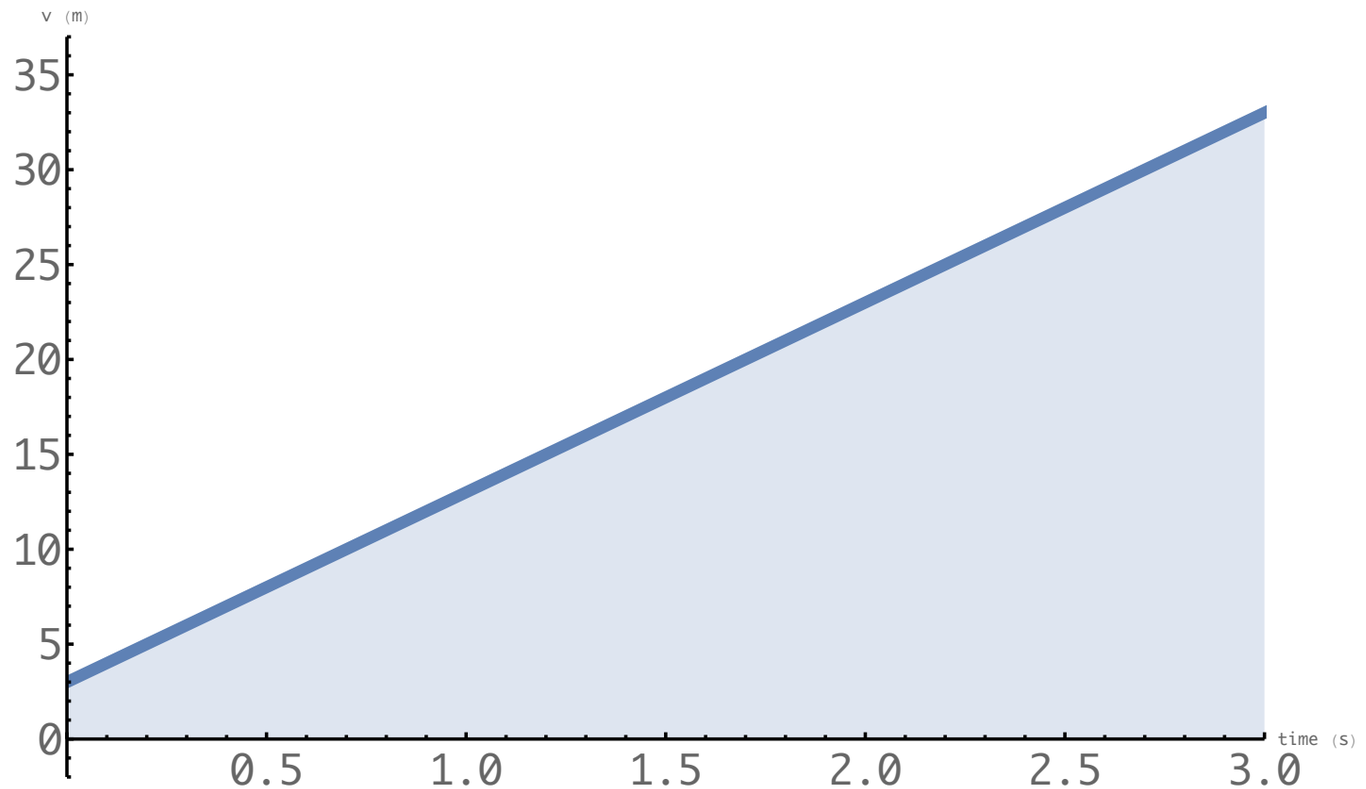
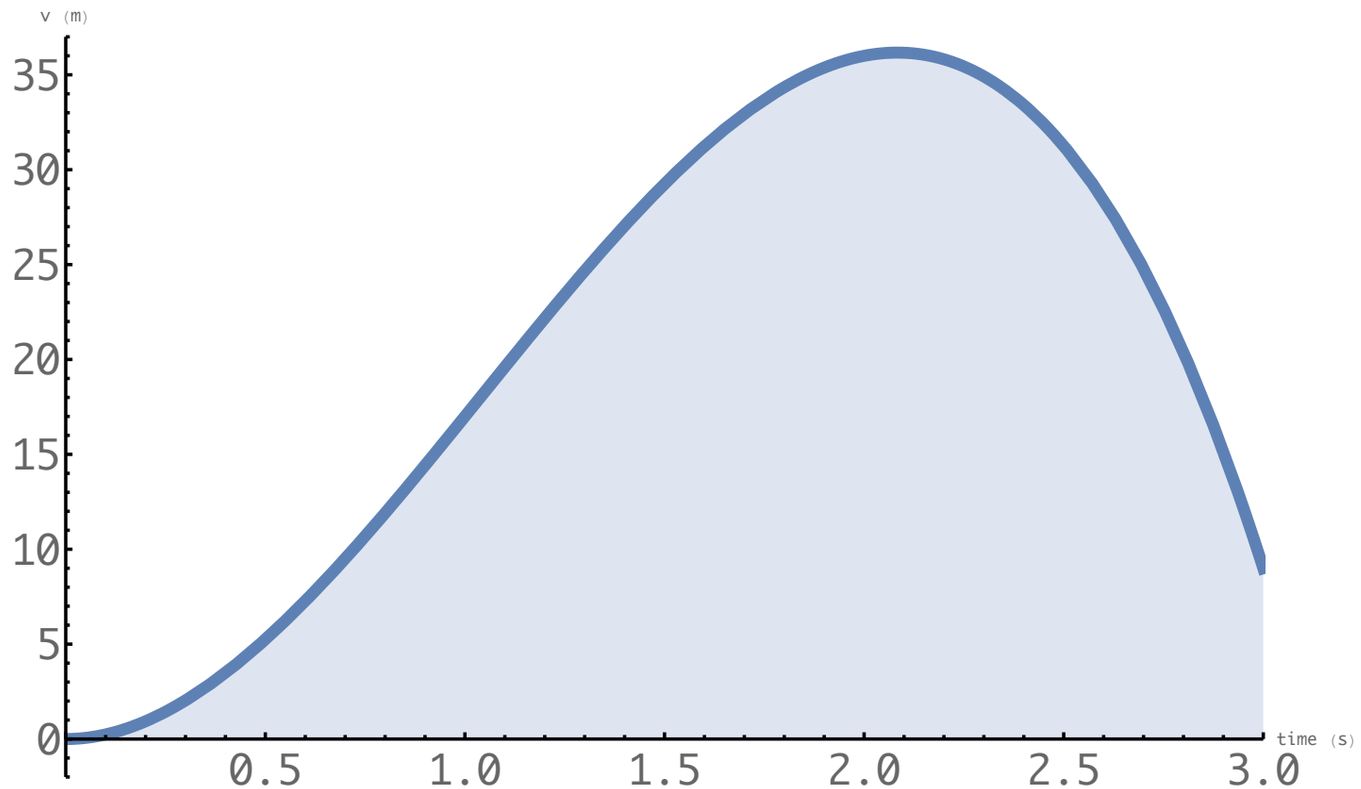


$$s_f = s_i + \text{area under curve}$$

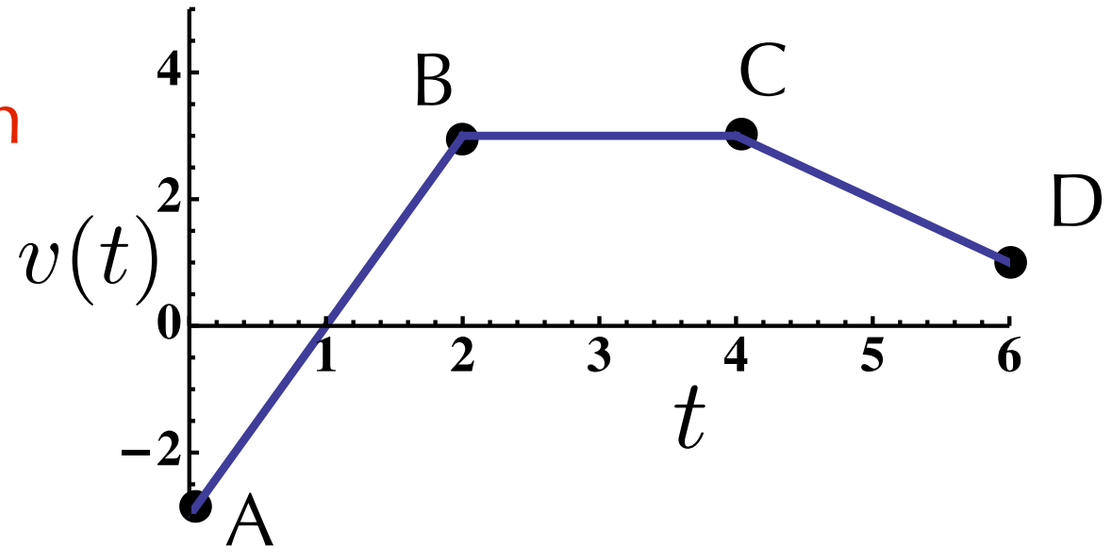
Finding Position from Velocity



$$s_f = s_i + \text{area under curve}$$

The object is located at x = 5 m at t = 0 s. What is the object's location at t = 1 s

$$v(t) \rightarrow x(t)$$



at t = 2 s?

at t = 4 s?

Question #1

a) 6.5 m
b) 1.5 m
c) 3.5 m
d) -1.5 m
e) 8 m

Question #2

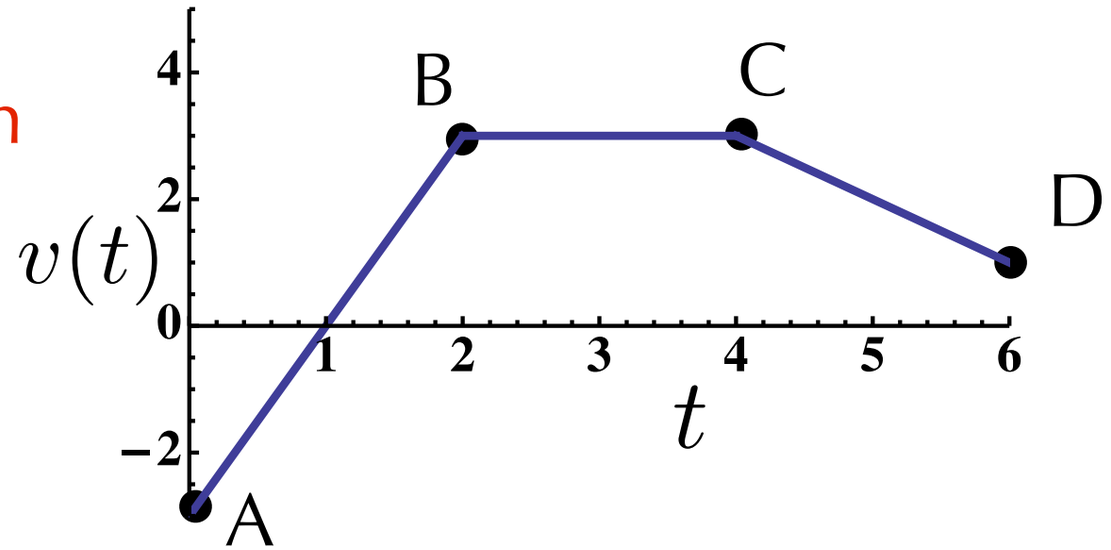
a) 3.5 m
b) 1.5 m
c) 6.5 m
d) 0 m
e) 5 m

Question #3

a) 11 m
b) 3.5m
c) 6 m
d) 5 m
e) 8 m

The object is located at x = 5 m at t = 0 s. What is the object's location at t = 1 s

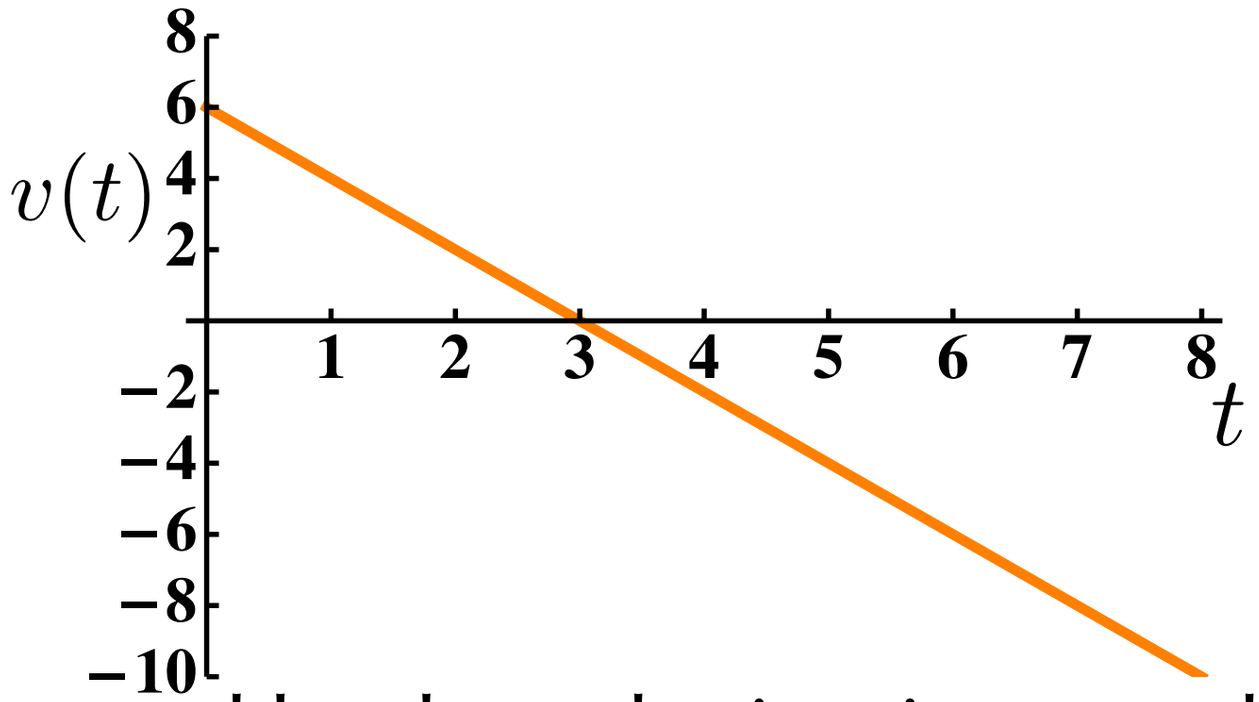
$$v(t) \rightarrow x(t)$$



at t = 2 s?

at t = 4 s?

Question #4



The object represented by the velocity-time graph above is at x=7 at t=0. Does the object ever reach x=0? If so, at what time does this happen?

a) The object never reaches the origin.

b) The object reaches the origin at t = 7.

c) The object reaches the origin at t = 6.

d) The object reaches the origin at t = 3.

e) I have no idea.

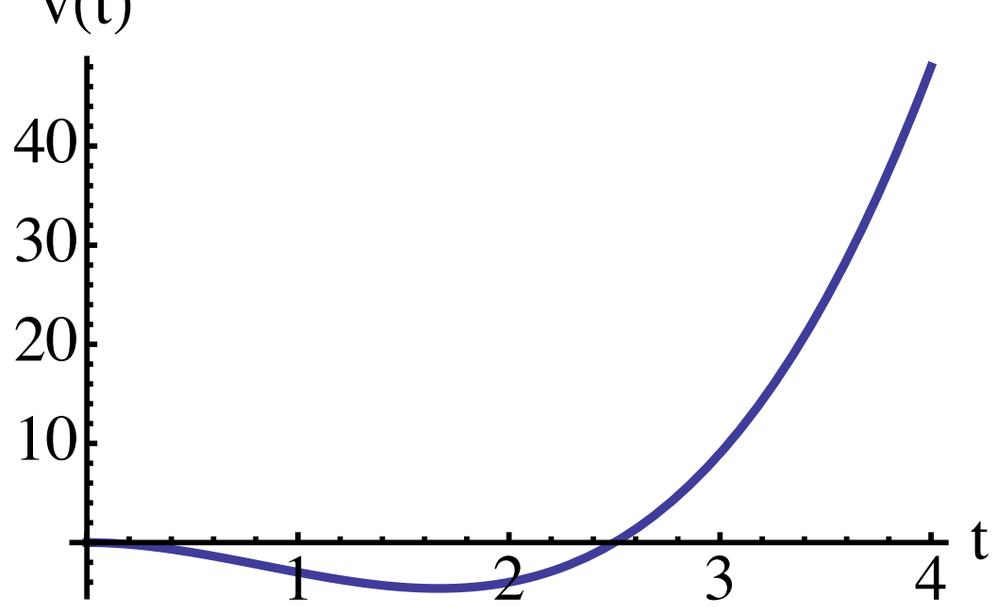
Question #5

The velocity of a particle is given by the expression

$$v(t) = 2t^3 - 5t^2$$

If the object's position at $t = 1$ is $x = 5$,

what is it's position when $t = 3$?



a) -10/3

b) 3

c) 5

d) -10

e) 5/3

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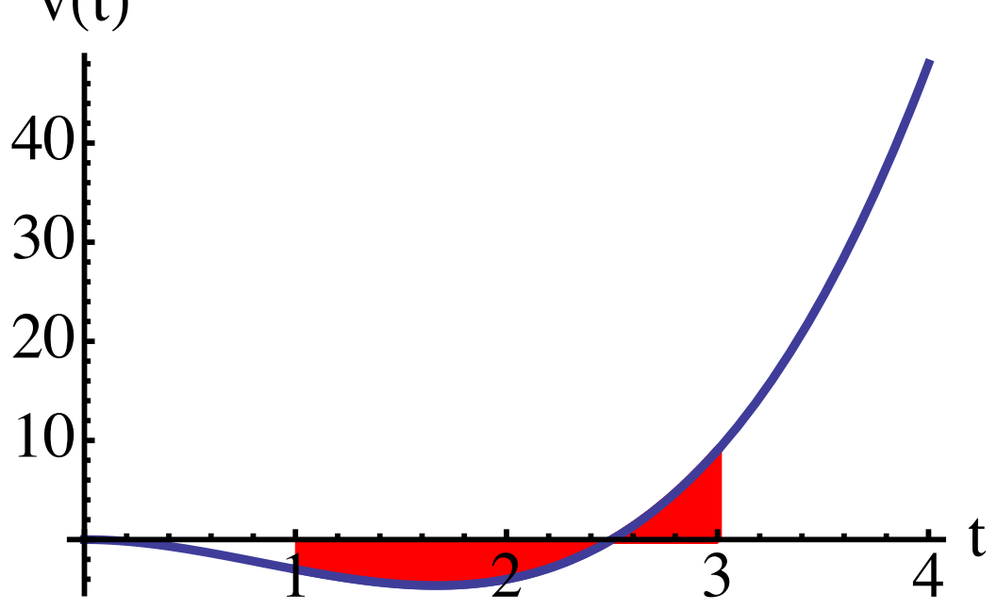

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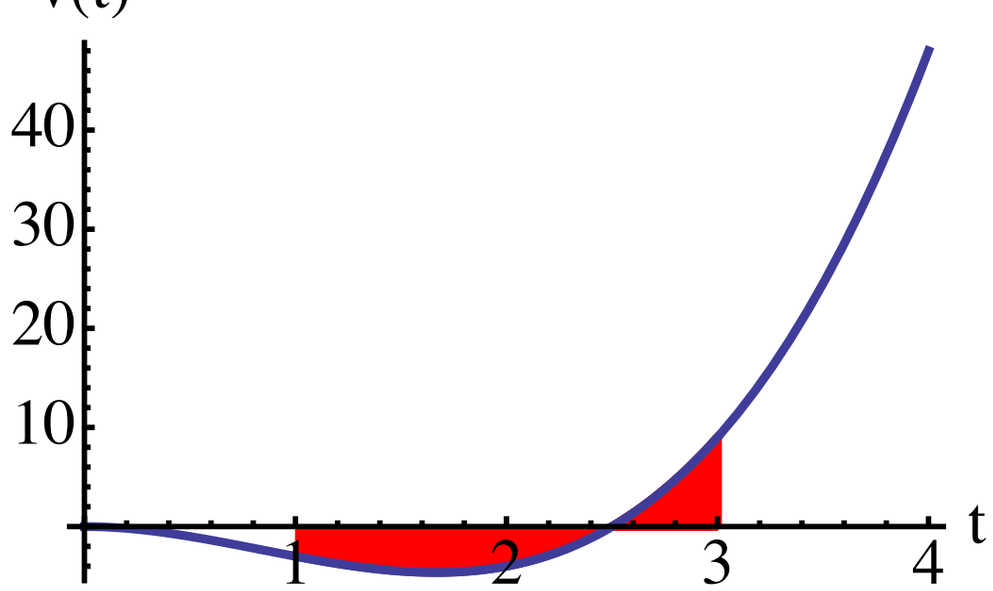


a) -10/3

b) 3

c) 5

d) -10

e) 5/3

$$\Delta x = \int_1^3 2t^3 - 5t^2 dt = \frac{1}{2}t^4 - \frac{5}{3}t^3\Big|_1^3 = -\frac{10}{3}$$

Techniques for integration

$$\int_{t_i}^{t_f} ct^n dt = \left. \frac{ct^{n+1}}{n+1} \right|_{t_i}^{t_f} = \frac{c}{n+1}(t_f^{n+1} - t_i^{n+1})$$

$$\int_{t_i}^{t_f} (u+w)dt = \int_{t_i}^{t_f} udt + \int_{t_i}^{t_f} wdt$$

A Helpful Chart

Differentiate

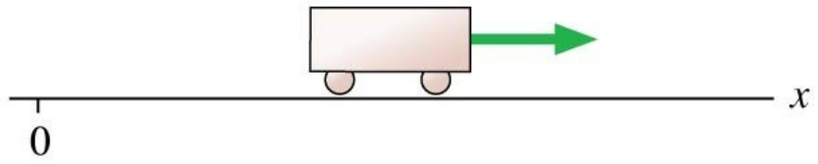
$$s \xrightarrow{} v \xrightarrow{} a$$

$$\xleftarrow{} \xleftarrow{}$$

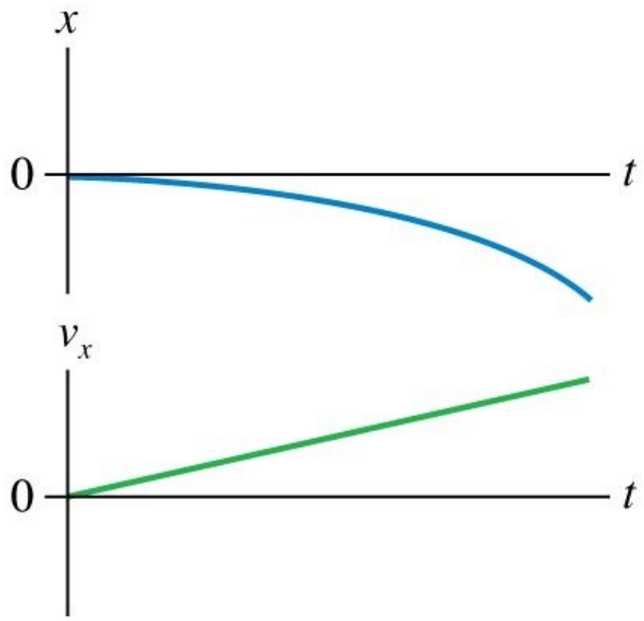
Integrate

Question #6

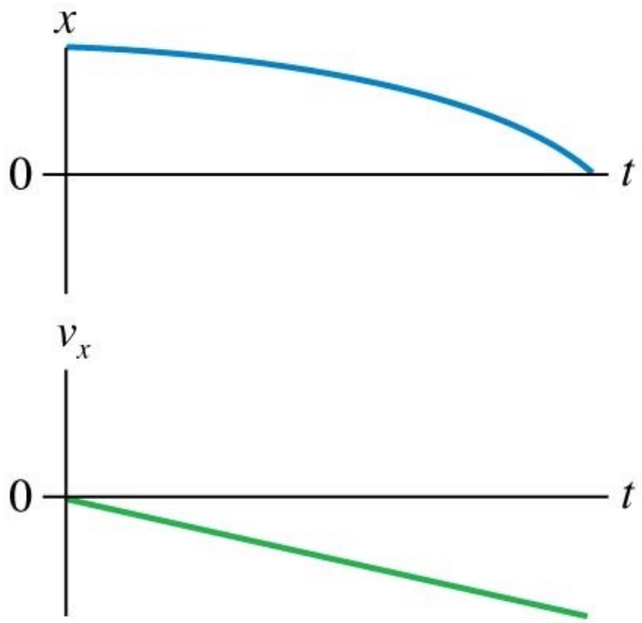
A cart slows down while moving away from the origin. What do the position and velocity graphs look like?



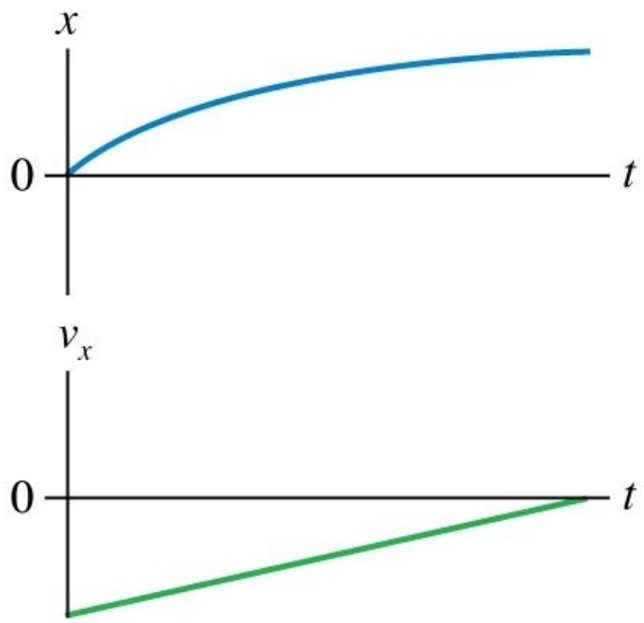
C



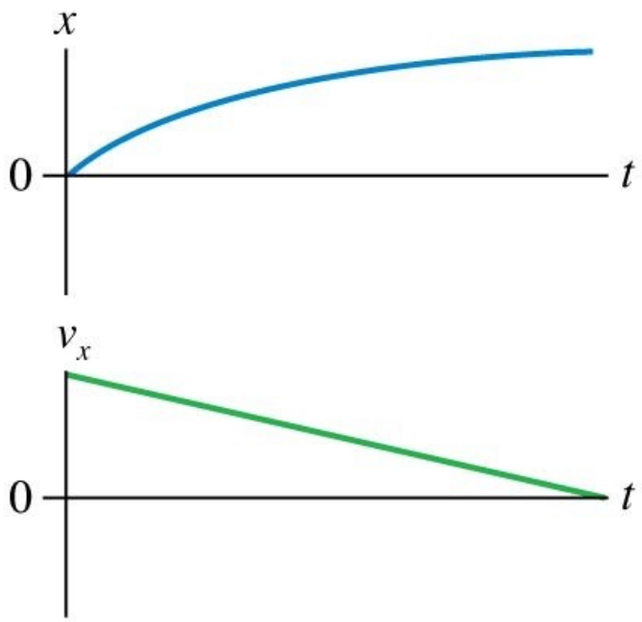
A



B

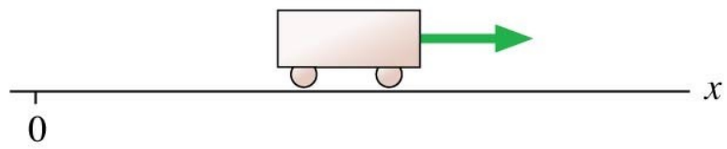


D

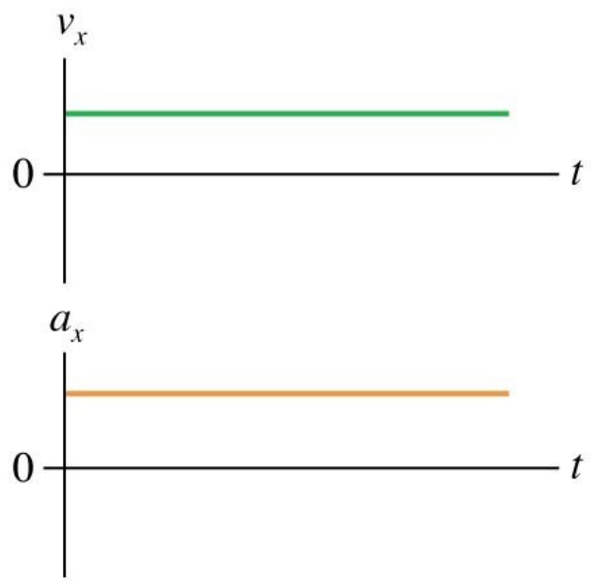


Question #7

A cart speeds up while moving away from the origin. What do the velocity and acceleration graphs look like?



A



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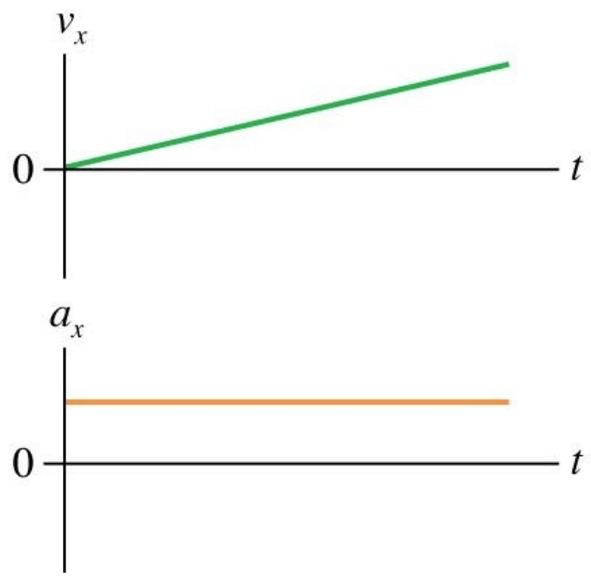

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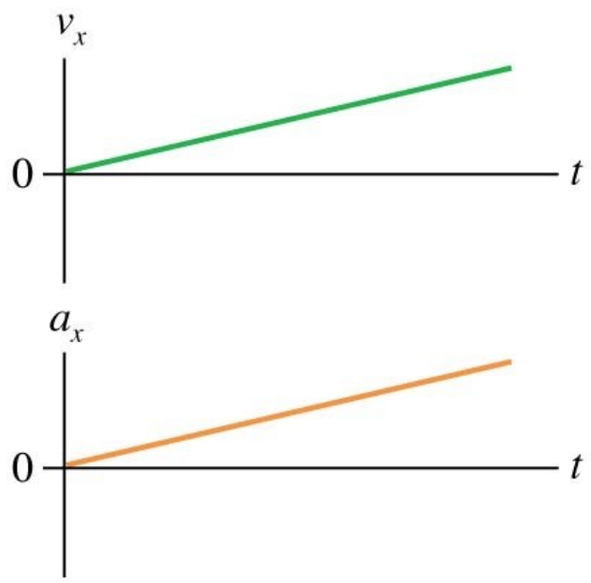

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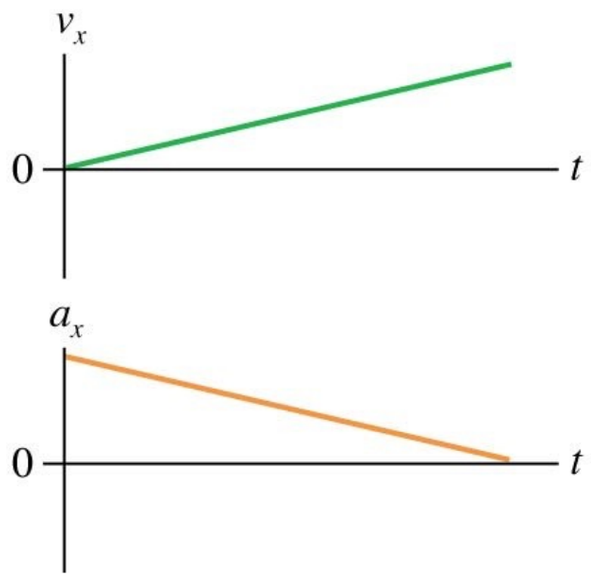
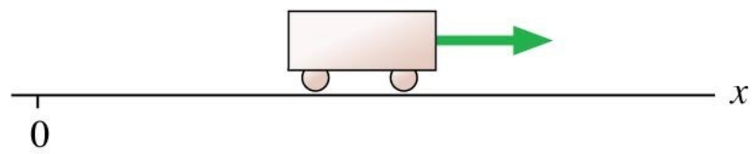


Question #8

A cart slows down while moving away from the origin. What do the velocity and acceleration graphs look like?



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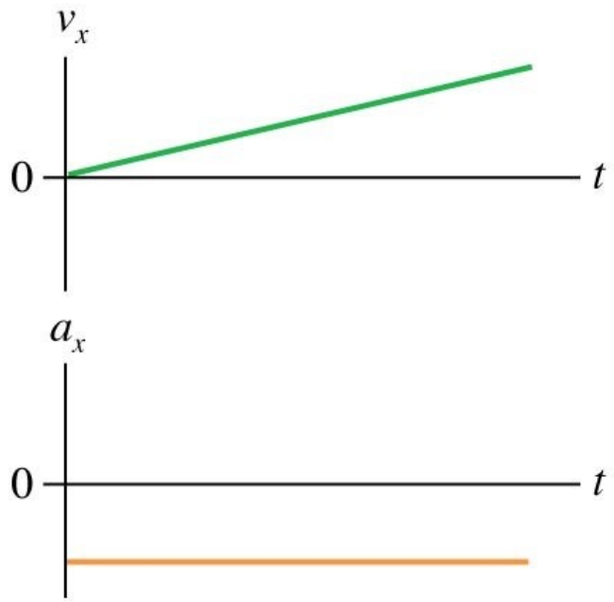
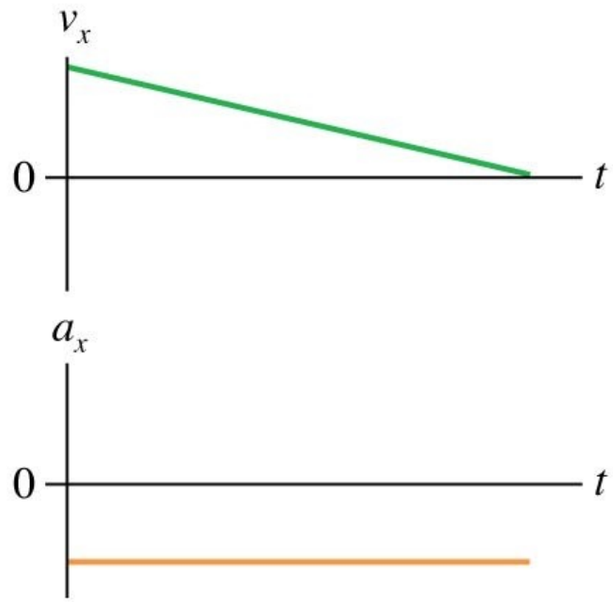


A



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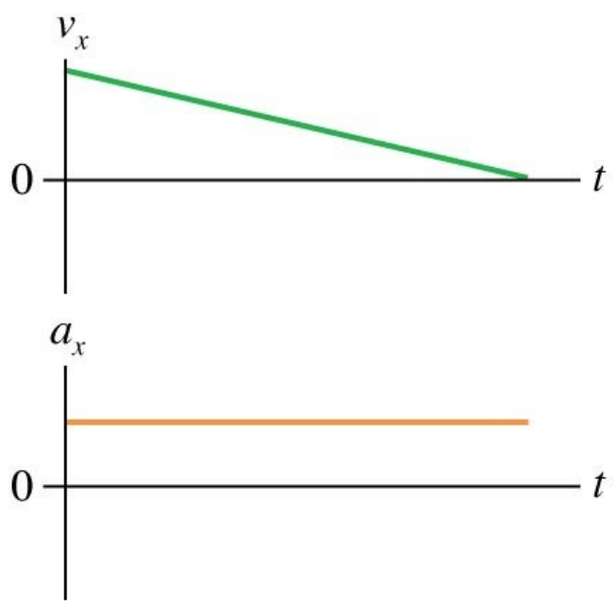

C