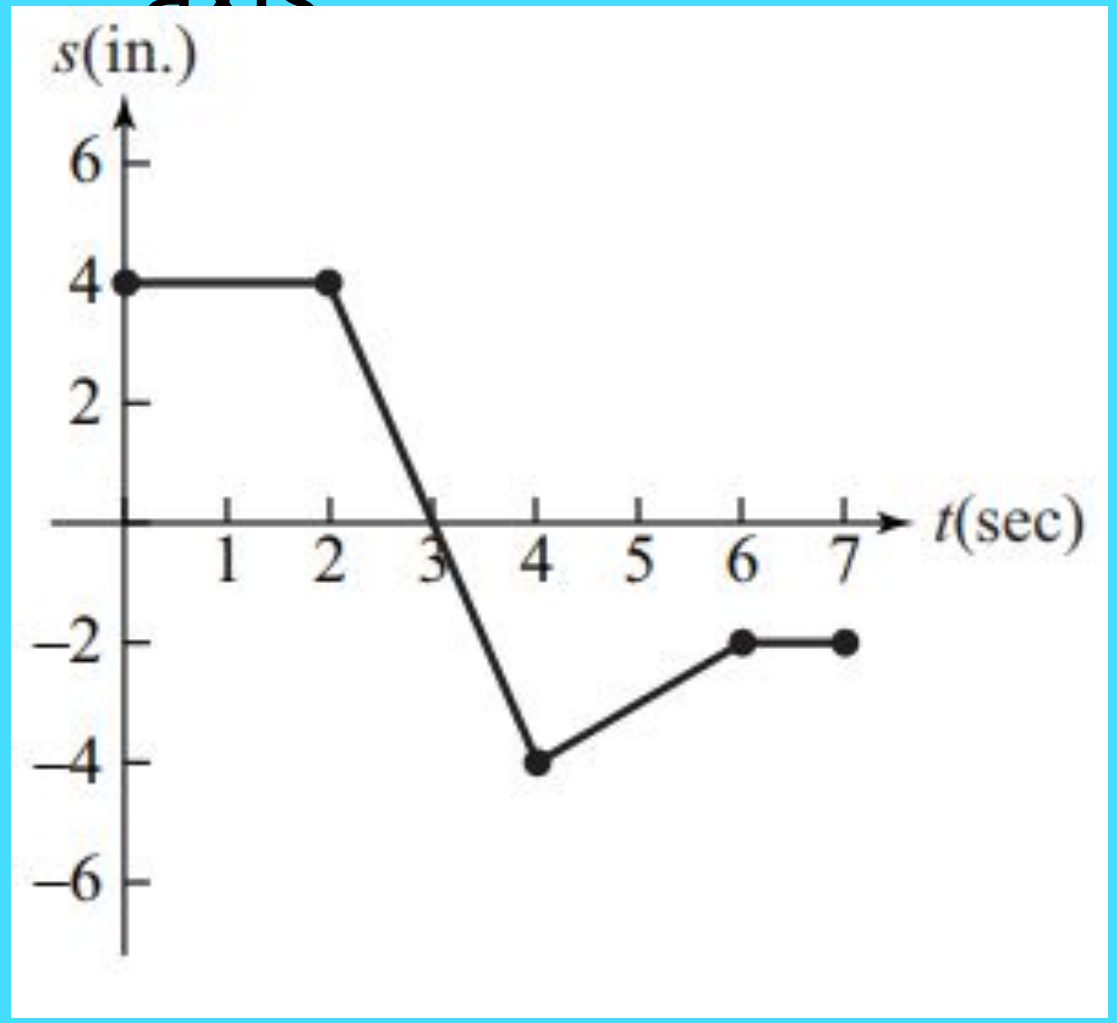
Find the derivative using the formal definition of derivative:

$$2/(X+3)$$

Particle Motion

https://www.youtube.com/watch?v=ZM8ECpBuQYE

The graph shows the position s(t) of a particle moving along a horizontal coordinate axis

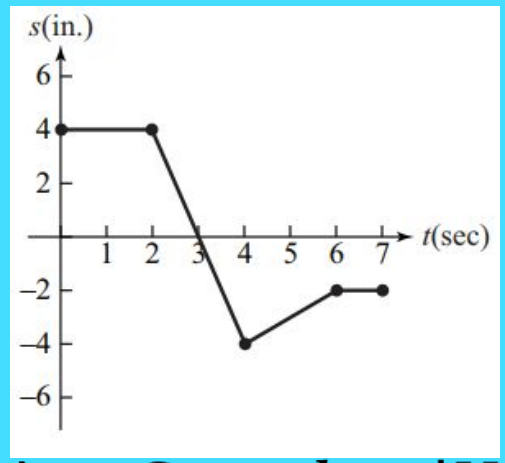


a) When is the particle moving left? **(2, 4)**

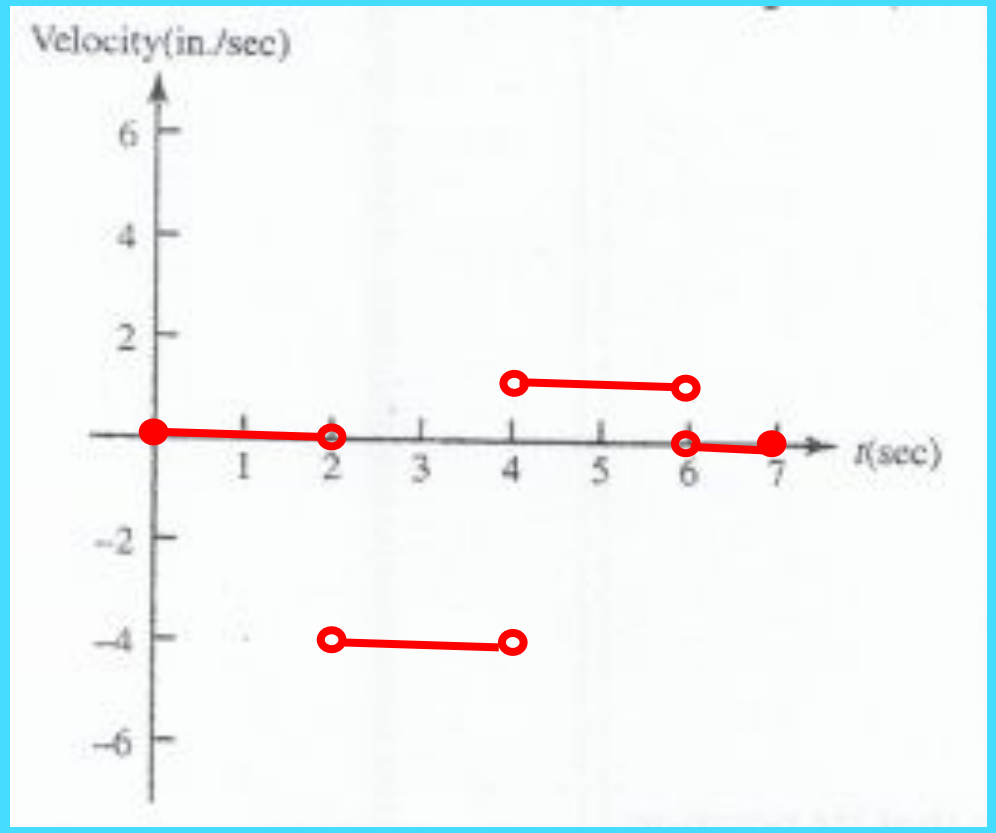
b) When is the particle moving right? **(4, 6)**

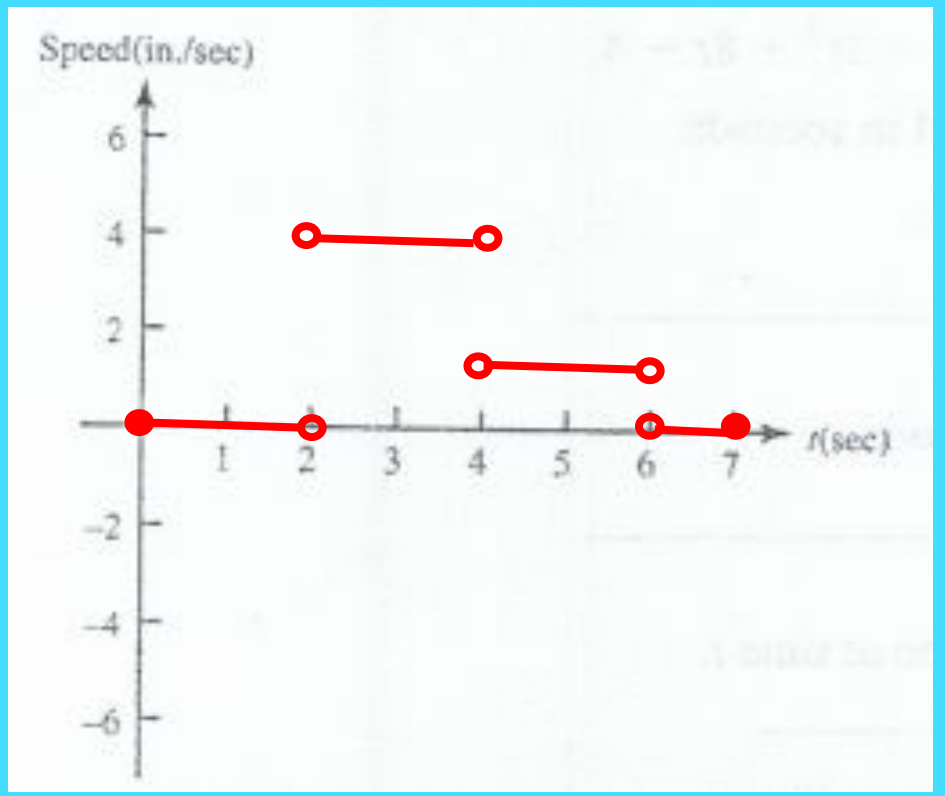
c) When is the particle standing still? **[0, 2]U [6, 7]**

d. Graph the particle's velocity and speed (where defined)



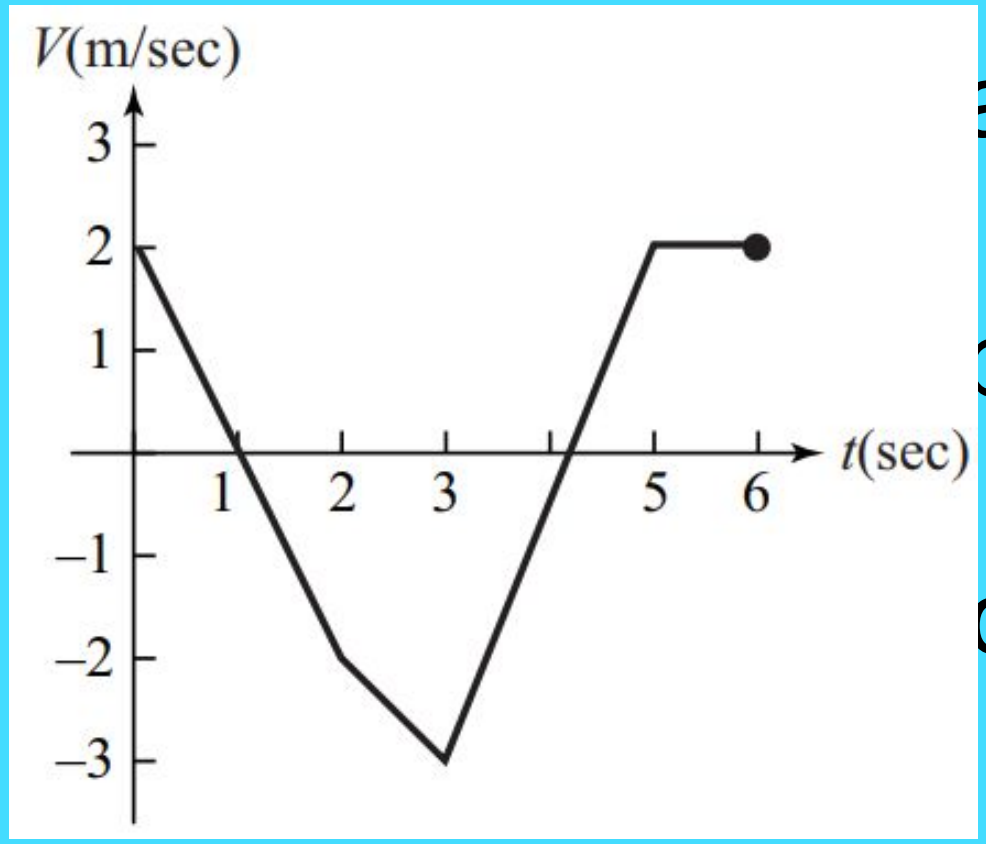
Keep in mind: $Velocity = \frac{\Delta\, position}{\Delta\, time}$ and $Speed = |Velocity|$





e. When is the particle moving fastest?

The graph shows the velocity v=f(t) of a particle moving along a horizontal coordinate axis.



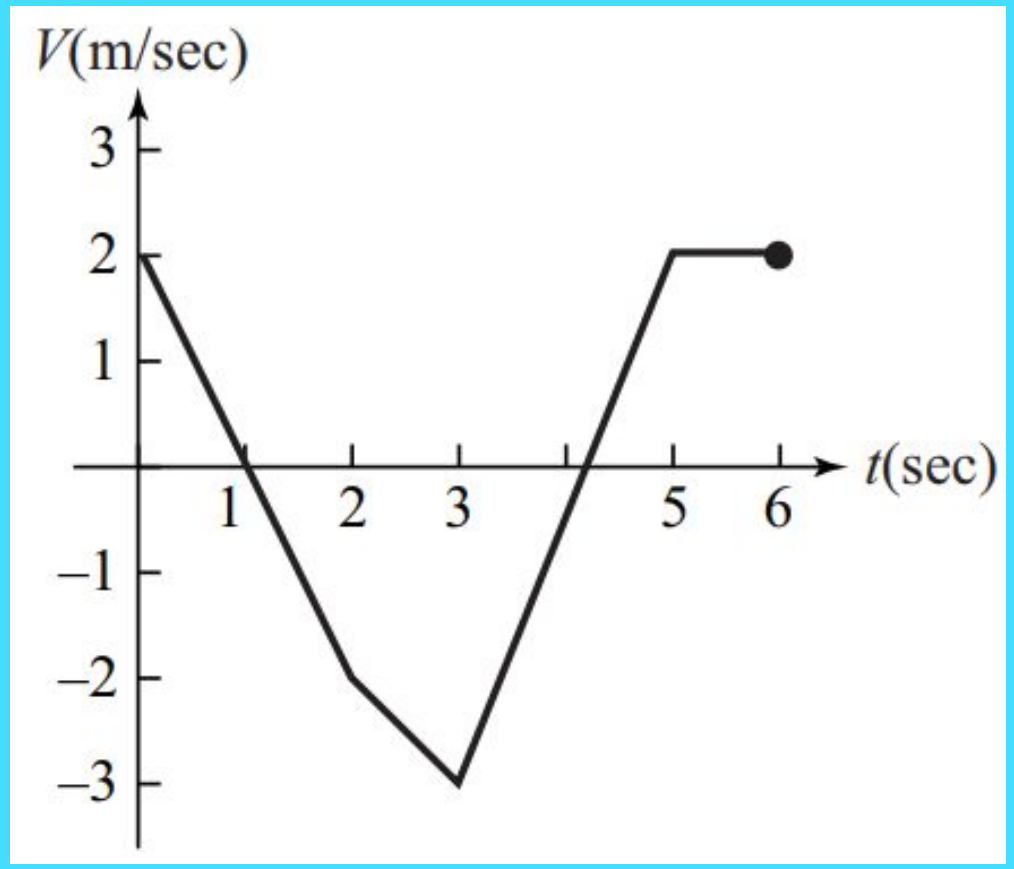
a. When does the particle reverse direction? **t=1, 4.25 sec**

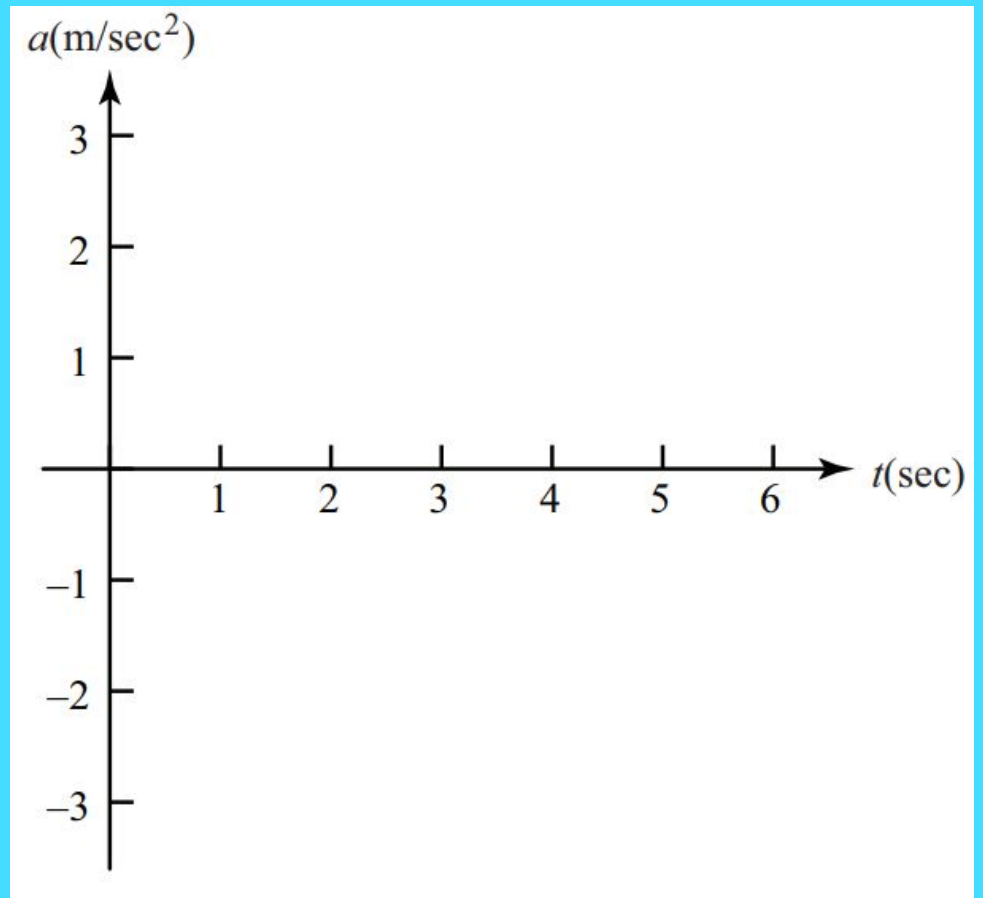
b. When is the particle moving at a constant speed? **(5, 6) sec**

c. When is the particle moving at its greatest speed? **t = 3 sec**

d. Graph the acceleration (where defined)

- Keep in mind: $Acceleration = \frac{\Delta\, Velocity}{\Delta\, time}$





A particle moves along a vertical coordinate axis so that its position at any time $t \geq 0$ is given by the function $g(t) = \frac{1}{3}t^3 - 3t^2 + 8t - 4$.

a. Find the displacement ($\Delta\ position$) during the first 6 seconds.

g(6) – g(0) = 8 – (-4) = 12

b. Find the average velocity during the first 6 seconds.

$$Velocity = \frac{\Delta\ position}{\Delta\ time} \qquad \frac{g(6) - g(0)}{6 - 0} = \frac{12cm}{6\ sec} = 2\ cm/s$$

c. Find expressions for the velocity and acceleration at time t. Hmm..

$Velocity = \frac{\Delta\, position}{\Delta\, time}$ AKA SLOPE of the position function

And

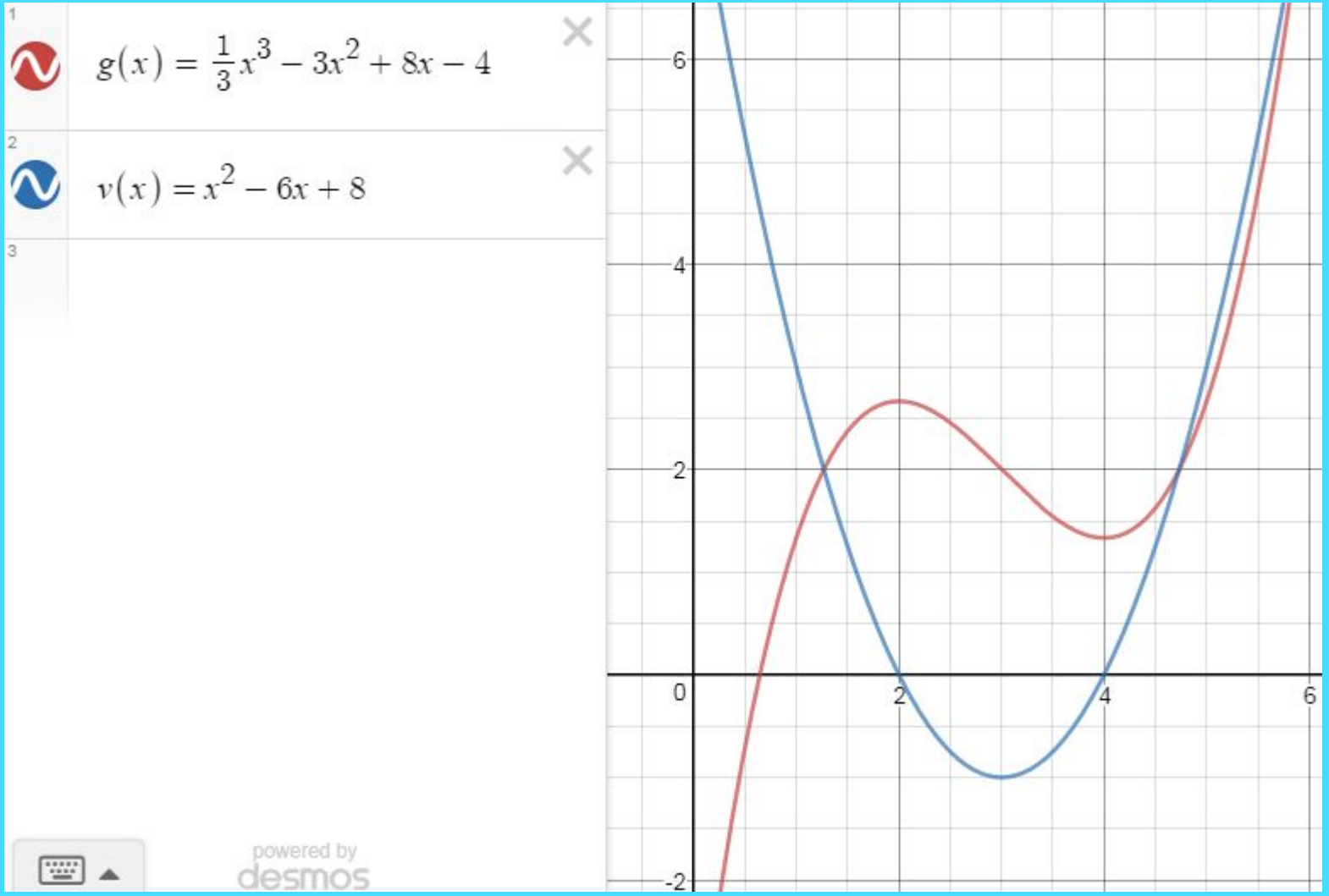
$Acceleration = \frac{\Delta\, Velocity}{\Delta\, time}$ AKA SLOPE of the velocity function

So if the position at time t is modeled by $g(t) = \frac{1}{3}t^3 - 3t^2 + 8t - 4$

Velocity at time t can be modeled by: $v(t) = t^2 - 6t + 8$

Acceleration at time t can be modeled by: $a(t) = 2t - 6$

d. For what values of t is the particle moving downward?



Look at the graph of either the position function or the velocity function!

(2, 4) on the red graph (position) shows a negative slope

(2, 4) on the blue graph shows a negative velocity (movement in the negative direction)

e. Find the total distance traveled from 0 to 6 seconds.

$$g(0) = \frac{1}{3}(0)^3 - 3(0)^2 + 8(0) - 4 = \mathbf{-4}$$

$$g(2) = \frac{1}{3}(2)^3 - 3(2)^2 + 8(2) - 4 = \mathbf{\frac{8}{3}}$$

$$g(4) = \frac{1}{3}(4)^3 - 3(4)^2 + 8(4) - 4 = \mathbf{\frac{4}{3}}$$

$$g(6) = \frac{1}{3}(6)^3 - 3(6)^2 + 8(6) - 4 = \mathbf{8}$$