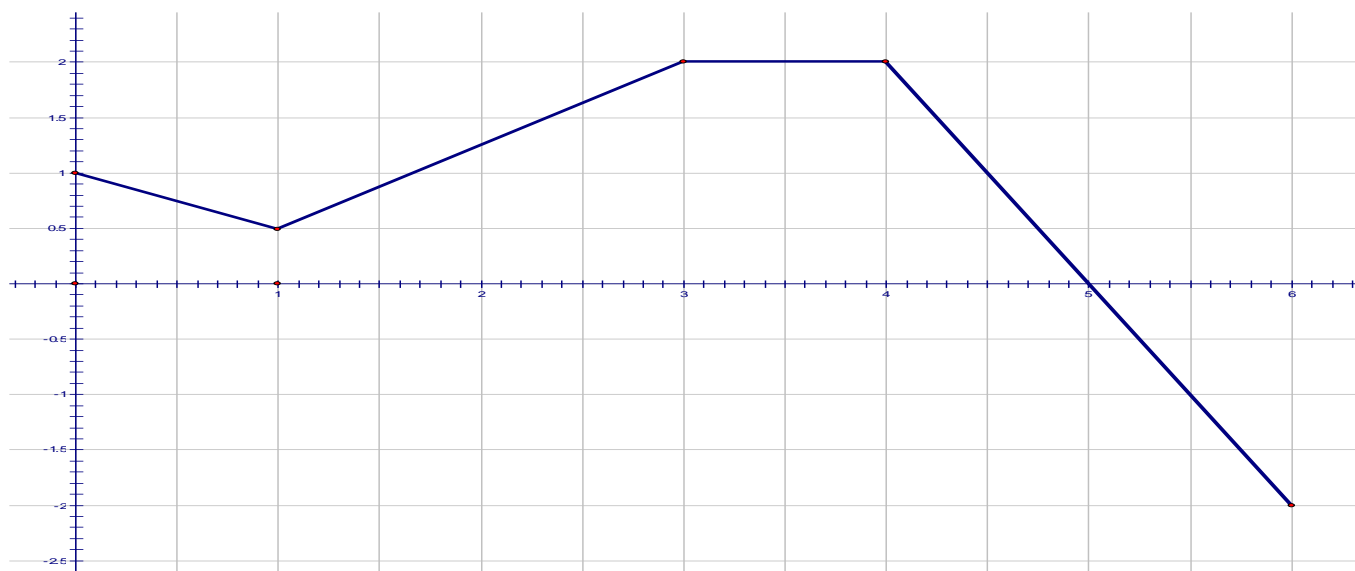


**AP Calculus AB**  
**Unit 2 - Differentiation**  
**2.5B - Linear Motion**

$s'(t) > 0$	$\rightarrow v(t) > 0$	$\rightarrow$	Object is moving to the right/up.
$s'(t) < 0$	$\rightarrow v(t) < 0$	$\rightarrow$	Object is moving to the left/down.
$s'(t) = 0$	$\rightarrow v(t) = 0$	$\rightarrow$	Object is at rest.
$s'(t)$ or $v(t)$ changes +ve to -ve or -ve to +ve			$\rightarrow$ Object has changed direction.

1. The graph below shows the position,  $s$ , of an object as a function of time,  $t$ .

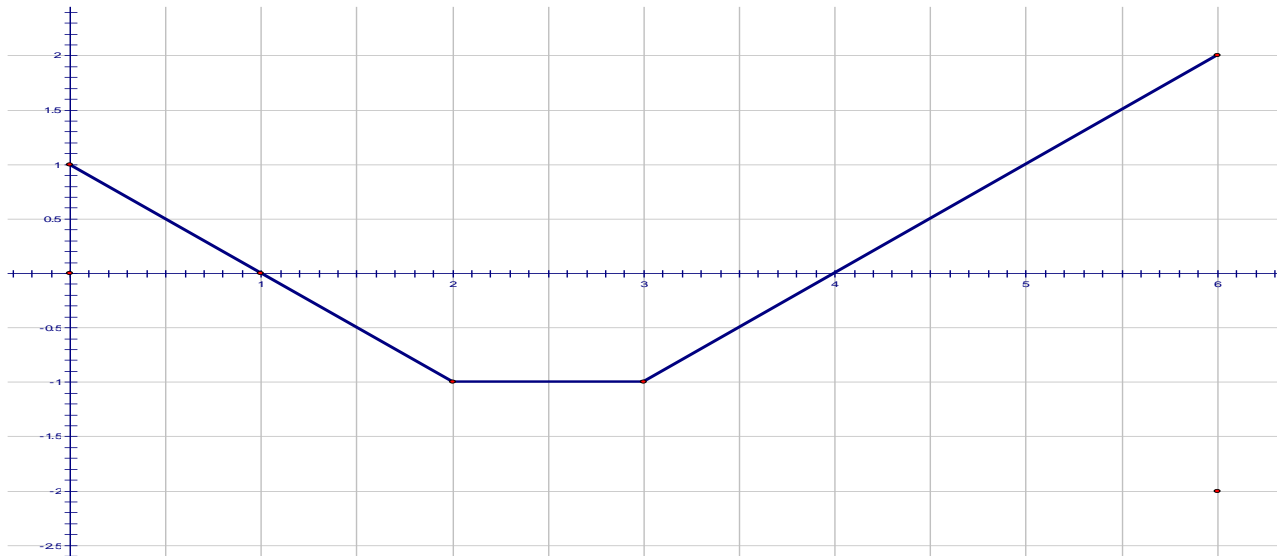


a. Describe the slope of the graph and the object's motion during the following time intervals:

Time, $t$	Slope of $s(t)$ $= s'(t) = v(t)$	Description of Motion
<b>[0, 1]</b>		
<b>[1, 3]</b>		
<b>[3, 4]</b>		
<b>[4, 6]</b>		
<b><math>[1, 1^+]</math></b>		

b. When is the object moving at its greatest speed?

2. The graph below shows the velocity,  $v$ , of an object as a function of time,  $t$ .



a. Describe the object's motion during the following time intervals:

Time, $t$	Sign of $v(t)$	Slope of $v(t)$ $= v'(t) = a(t)$	Description of Motion
[0, 1]			
[1, 2]			
[2, 3]			
[3, 4]			
[4, 6]			
$[1, 1^+]$			
$[4, 4^+]$			
1 and 4			

b. When is the object moving at its greatest speed?

3. A car enters the freeway at time,  $t = 0$  seconds. Its position at time  $t$  is given by:  $s(t) = 84t - t^3$  meters.

a. What is the velocity of the car as it enters the freeway?

b. Is the car speeding up or slowing down at  $t = 1$ ?

c. After how many seconds does the car turn around? How far from the freeway entrance does this occur?