

Calculus Name _____

An object moves along a line so that its position at time t is given by $s(t) = t^3 - 3t^2 + 3t + 2$ where $t \geq 0$.

a. What is the object's position at time $t = 2$?

$$s(2) = 2^3 - 3(2)^2 + 3(2) + 2 = -4$$

b. What is the object's velocity at time $t = 2$?

$$s'(2) = v(2) = 3(2)^2 - 10(2) + 3 = -5$$

c. What is the object's acceleration at time $t = 2$?

$$a(2) = 6(2) - 10 = 2$$

d. Is the object speeding up or slowing down at $t = 2$? Justify your response.

Object is slowing down b/c $v(2) < 0$ & $a(2) > 0$ have diff signs.

e. When is the object at rest?

$$v(t) = 0 \Rightarrow 3t^2 - 10t + 3 = 0$$

f. When is the object moving fastest?

How far does the object travel in the first 4 seconds?

$v(t) = 3t^2 - 10t + 3$
 $(0, \frac{1}{3}) \cup (3, 4)$
 $s(0) = 2$
 $s(\frac{1}{3}) = \frac{67}{27}$
 $s(3) = -7$
 $s(4) = -2$

$|s(\frac{1}{3}) - s(0)| + |s(3) - s(\frac{1}{3})| + |s(4) - s(3)|$
 $\frac{404}{27}$

Particle moving at a constant speed
 Speeding up? $a(t) = 0$
 $v(t)$ & $a(t)$ both +
 Slowing down? diff signs or both -

Nov 7-9:45 AM

$g(x) = x \sin x - 2x$
 $g(\pi/2) = \frac{\pi}{2} \sin \pi/2 - 2(\pi/2)$
 $= \pi/2 - \pi$
 $= \frac{\pi}{2} - \frac{2\pi}{2} \rightarrow -\pi/2$

$g'(x) = x \cos x + 1 \sin x - 2$
 $= \pi/2 \cos \pi/2 + 1 \sin \pi/2 - 2$
 $= \frac{\pi}{2}(0) + 1 - 2 = -1$

$y + \pi/2 = -1(x - \pi/2)$

Nov 7-10:03 AM

$y = \frac{\sin x}{1 + \cos x}$
 $y' = \frac{(1 + \cos x)(\cos x) - \sin x(-\sin x)}{(1 + \cos x)^2}$
 $= \frac{\cos x + \cos^2 x + \sin^2 x}{(1 + \cos x)^2}$
 $\frac{\cos x + 1}{(1 + \cos x)^2} \rightarrow \frac{1}{1 + \cos x}$

Nov 7-10:08 AM