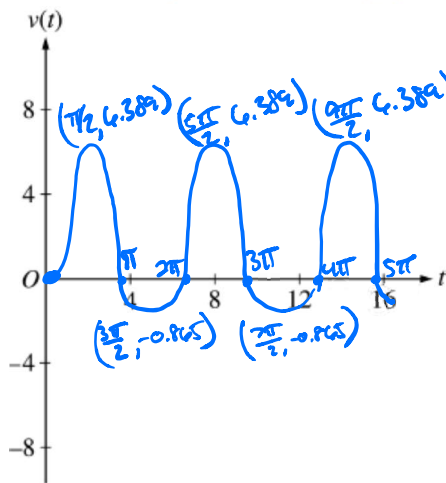


2002 AP[®] CALCULUS AB (Form B)
Problem #3 (Calculator)

A particle moves along the x -axis so that its velocity v at any time t , for $0 \leq t \leq 16$, is given by $v(t) = e^{2\sin t} - 1$. At time $t = 0$, the particle is at the origin. $\rightarrow p(0) = 0$

(a) On the axes provided, sketch the graph of $v(t)$ for $0 \leq t \leq 16$.



(b) During what intervals of time is the particle moving to the left? Give a reason for your answer.

The particle is moving left when $v(t) < 0$.
 $v(t) < 0$ on $(\pi, 2\pi)$ and $(3\pi, 4\pi)$ and $(5\pi, 16)$

(c) Find the total distance traveled by the particle from $t = 0$ to $t = 4$.

$$\text{Total Distance} = \int_0^4 |v(t)| dt = 10.543 \text{ units}$$

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$$y_1 = |e^{2\sin x} - 1|$$

(d) Is there any time t , $0 < t \leq 16$, at which the particle returns to the origin? Justify your answer.

$\int_0^T v(t) dt > 0$ for all $T > 0$
 \therefore There is no such time