$$\nearrow \sin\left(\frac{\pi t}{3}\right)$$
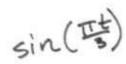
An object moves along the $x$ – axis with initial position $x(0) = 2$. The velocity of the object at time $t \geq 0$ is given by the function $v(t) = \sin\left(\frac{\pi}{3}t\right)$.

a. What is the acceleration of the object at time $t = 4$?

$$v'(t) = a(t) = \cos\left(\frac{\pi}{3}t\right) \cdot \frac{\pi}{3}$$

$$a(4) = \frac{\pi}{3}\cos\left(\frac{\pi}{3} \cdot 4\right)$$

$$= \frac{\pi}{3} \cdot -\frac{1}{2}$$

$$= \boxed{-\frac{\pi}{6}}$$

b. Consider the following two statements.

Statement I:    For $3 < t < 4.5$, the velocity of the object is decreasing.

Statement II:   For $3 < t < 4.5$, the speed of the object is decreasing.

Are either or both of these statements correct? For each statement, provide a reason why it is correct or not correct.

Statement I: Since $v'(4) = a(4) < 0$, then $v(t)$ must be decreasing. $\boxed{\text{True}}$

Statement II: $v(4) = \sin\left(\pi/3 \cdot 4\right) = -\frac{\sqrt{3}}{2} < 0$.
This statement is $\boxed{\text{false}}$ b/c speed is increasing since $a(4)$ and $v(4)$ are the same signs.