2. For $t \geq 0$, a particle moves along the x-axis. The velocity of the particle at time t is given by $v(t) = 1 + 2\sin\left(\frac{t^2}{2}\right)$. The particle is at position $x = 2$ at time $t = 4$.

   (a) At time $t = 4$, is the particle speeding up or slowing down?

   (b) Find all times t in the interval $0 < t < 3$ when the particle changes direction. Justify your answer.

   (c) Find the position of the particle at time $t = 0$.

   (d) Find the total distance the particle travels from time $t = 0$ to time $t = 3$.

END OF PART A OF SECTION II