9. [10 points]
   
   a. [6 points] As a particle moves in the xy plane, it traces out the curve \( y = g(x) \) for \( 1 \leq x \leq 5 \), where \( g(x) \) is the function
   \[
g(x) = \int_{2x}^{x^4} \sin(t^3) \, dt + 100e^x.
   \]
   Set up, but do not evaluate, an expression with a single integral which gives the arclength of the path of the particle. Your answer should not involve the letter \( g \).

   b. [4 points] A different particle is traveling with velocity given by \( v(t) \) meters/second, where \( v(t) \) is the function in the following graph: The units of \( t \) are seconds.

   ![Graph of \( y = v(t) \)]

   Using a left Riemann sum with four subdivisions, estimate the distance the particle travels in the first 8 seconds of its journey. Is this an underestimate or an overestimate of the actual distance traveled in the first 8 seconds? Justify your answer.