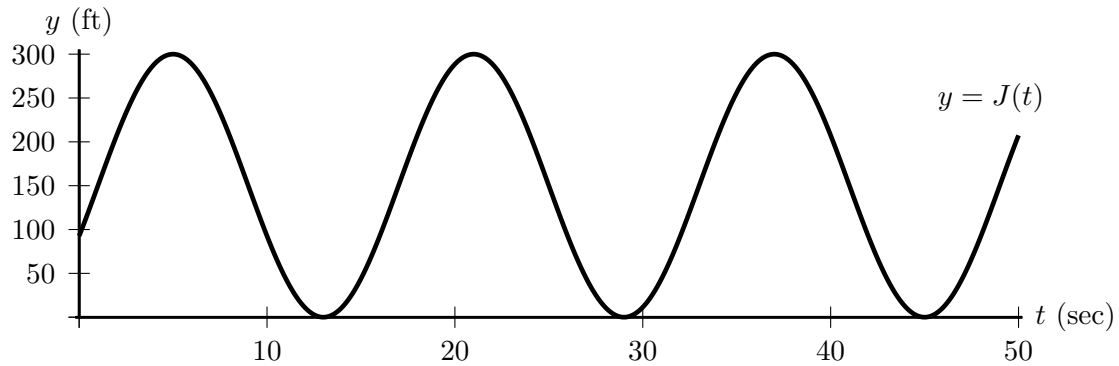


4. [12 points] A dare devil jumps off the side of a bungee jumping platform while attached to a magically elastic bungee cord. Just a few moments after the jump begins, a timer is started and her position is recorded. At t seconds after the timer begins, her distance in feet below the platform is given by the function

$$J(t) = -150 \cos(0.125\pi(t + 3)) + 150.$$

A portion of the graph of $y = J(t)$ is shown below.



Throughout this problem, do not make estimates using the graph.

- a. [2 points] Compute the average velocity of the bungee jumper during the first 16 seconds after the timer begins.

Answer: average velocity = _____

- b. [3 points] Recall that *average speed* over an interval of time is given by $\frac{\text{distance traveled}}{\text{time elapsed}}$. Compute the average speed of the bungee jumper during the first 16 seconds after the timer begins.

Answer: average speed = _____

- c. [5 points] Use the limit definition of instantaneous velocity to write an explicit expression for the instantaneous velocity of the bungee jumper 2 seconds after the timer begins. *Your answer should not involve the letter J . Do not attempt to evaluate or simplify the limit.*

Answer: _____

- d. [2 points] Find all values of t in the interval $0 \leq t \leq 30$ when the instantaneous velocity of the bungee jumper is 0 feet per second.

Answer: _____