Exploration 3

Below is the graph of the speed v of an object (in ft/sec) over a 20 second time period. In this exploration, you will estimate the distance the object travelled during this time.

1. Break the 20 second time interval into 2 second subintervals. Approximate the varying speed over each subinterval with the speed's value at the midpoint of each subinterval. For example, we will replace the speed's value over the first subinterval $[0, 2]$ with $v(1) \approx 7$ (ft/sec). On the same graph as $v(t)$ sketch the graph of this approximating step function.

2. Use the step function approximation of $v(t)$ to estimate the distance the object travelled over the time interval $[0, 20]$ seconds.

3. Evaluate $\displaystyle\int_0^{20} -0.3t^3 + 0.09t^2 + 0.95t + 6 \, dt$