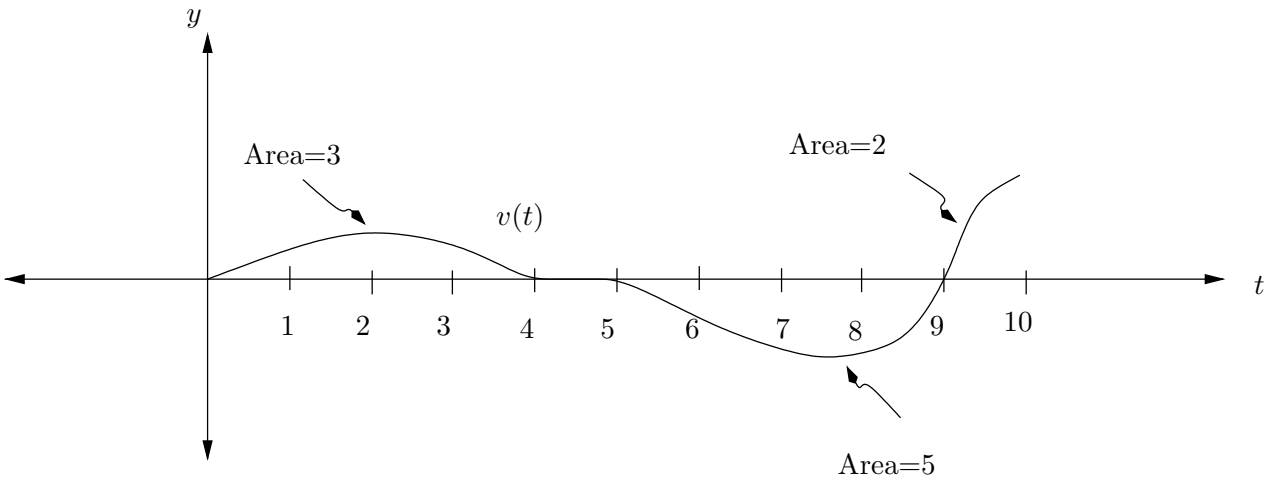
8. (3+3+3 points) Finally in your tropical paradise, you are strolling through the rain forest when you come upon a hummingbird. He is flitting up and down a vine of flowers. The graph below gives the bird's **vertical** velocity (ft/sec) as a function of time (sec). Positive velocity indicates he is going up, and negative velocity indicates down.



(a) At which time(s) is the hummingbird likely hovering at a flower? Explain how you arrived at your answer.

The hummingbird is likely hovering at a flower when there is an extended period of time of zero vertical velocity. This happens between 4 and 5 seconds.

(b) At which time during the 10-second period is the hummingbird highest off the ground? Explain how you arrived at your answer.

The hummingbird's height off the ground is given by it's height at time zero plus the integral of $v(t)$ over the time. One sees the hummingbird is highest at time $t = 4$ seconds because one loses more height between 5 and 9 seconds then one gains between 9 and 10 seconds.

(c) At which time(s) is the hummingbird's vertical acceleration the greatest? Explain how you arrived at your answer.

The vertical acceleration is the derivative of the velocity function, so one wants to see where the largest derivative of $v(t)$ is. It should be clear that this occurs at $t = 9$ seconds.