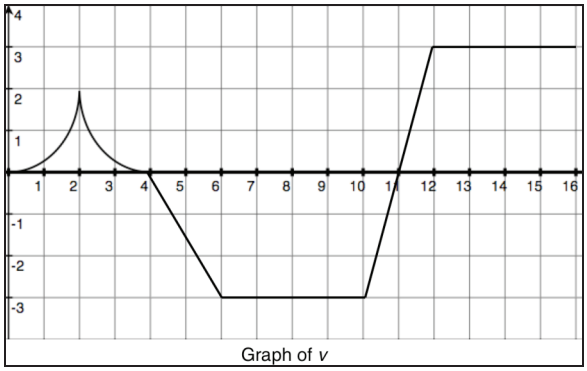
Example C5: A tightrope walker climbs a pole and walks along a tightrope that extends in a straight line in both directions from the pole. For $0 \le t \le 16$, the tightrope walker's velocity is modeled by the piecewise-function defined by the graph below. The graph is formed by two quarter-circles and 4 straight lines.



Graph of v

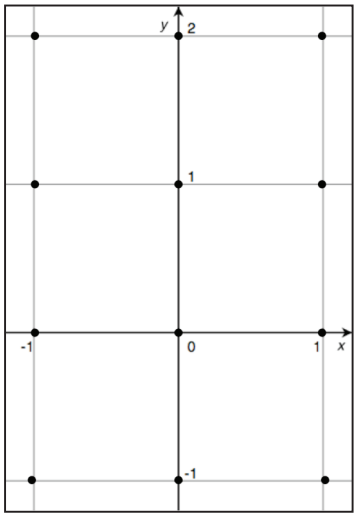
a) At what time in the interval $0 \le t \le 16$ is the tightrope walker stopped? (1)

b) At what time in the interval $0 \le t \le 16$ is the tightrope walker farthest from the pole? How far is he from the pole at that time? Justify your answers. (3)

c) Find the total distance the tightrope walker travels in the time interval $0 \le t \le 16$. (2)

d) Write expressions of the tightrope walker's velocity $v(t)$, acceleration $a(t)$, and distance from the pole $x(t)$ that are valid for the time interval $10 \le t \le 12$. (3)

Example C6: Consider the differential equation $\frac{dy}{dx} = -2x(y-1)$.



a) On the axis provided, sketch a slope field for the given differential equation at the 12 points indicated. (2)

b) Show that any point with initial condition that is along the y-axis where $y > 1$ creates a relative maximum for its particular solution. (3)

c) Find the particular solution $y = f(x)$ to the given differential equation with initial condition $f(0) = 4$. (3)

d) For the solution in part c), find $\lim_{x \to -\infty} f(x)$. (1)