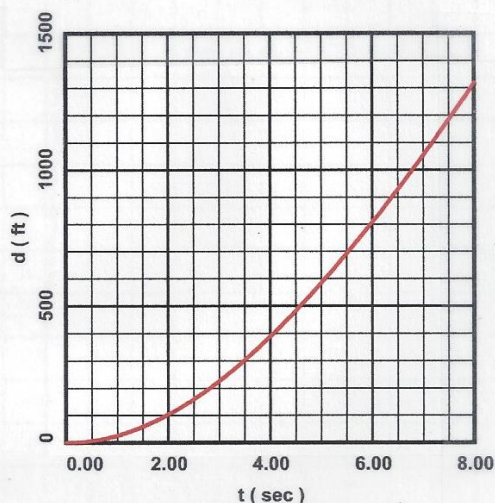


18.2. Velocities

10F1

Example. The graph shown is distance d , in feet, as a function of time t , in seconds, for a car which completes a 0.25-mile ($=1320$ ft) race in 8 seconds. The equation of the graph is

$$d = \frac{15}{16} (30t^2 - t^3).$$



(a) make a table of the equation at $t=0, 2, 4, 6$ and 8 seconds.

(b) From the table in part (a), calculate the velocities at $t=1, 3, 5$ and 7 sec.

(c) Use quadratic regression on the (t, v) -points from part (b). $r^2 = ?$

(d) Graph the (t, v) -points and the regression equation.

SOLUTION:

(a)

t	d
0	0
2	105
4	390
6	810
8	1320

(b)

$$v(1) = \frac{105 - 0}{2 - 0} = 52.5$$

$$v(3) = \frac{390 - 105}{4 - 2} = 142.5$$

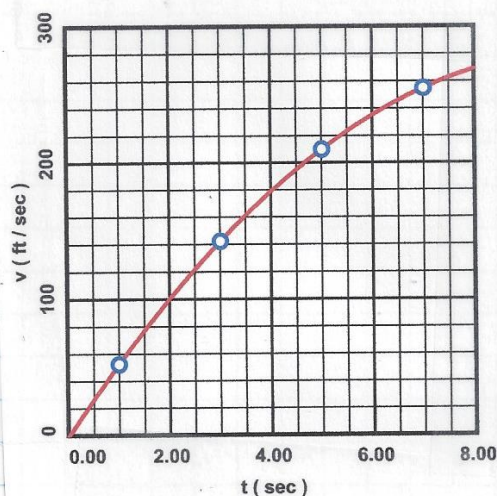
$$v(5) = \frac{810 - 390}{6 - 4} = 210.0$$

$$v(7) = \frac{1320 - 810}{8 - 6} = 255.0$$

t	v
1	52.5
3	142.5
5	210.0
7	255.0

(c) $v = -2.8125t^2 + 56.25t - 0.9375$,
 $r^2 = 1$

(d)



FACT The slope of a cubic function is a quadratic function