PARÁBOLA DE MÍNIMOS CUADRADOS

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Parábola de mínimos cuadrados

- $y = a + bx + cx^2$

- $\sum y = an + b\sum x + c\sum x^2$
- $\sum xy = a\sum x + b\sum x^2 + c\sum x^3$
- $\sum x^2y = a\sum x^2 + b\sum x^3 + c\sum x^4$

Ajustar una parábola de mínimos cuadrados a los datos:

x	y	x^2	x^3	x^4	xy	x^2y
1.2	4.5	1.44	1.728	2.0736	5.4	6.48
1.8	5.9	3.24	5.832	10.4976	10.62	19.116
3.1	7.0	9.61	29.791	92.3521	21.70	67.27
4.9	7.8	24.01	117.649	576.4801	38.22	187.278
5.7	7.2	32.49	185.193	1055.6001	41.04	233.928
7.1	6.8	50.41	357.911	2541.1681	48.28	342.788
8.6	4.5	73.96	636.056	5470.0816	38.7	332.82
9.8	2.7	96.04	941.192	9223.6816	26.46	259.308
$\sum x = 42.2$	$\sum y = 46.4$	$\sum x^2 = 291.2$	$\sum x^3 = 2275.352$	$\sum x^4 = 18971.9348$	$\sum xy = 230.42$	$\sum x^2y = 1448.988$

46.4=8 a+42.2 b+291.2 c

230.42=42.2 a+291.2 b+2275.352 c

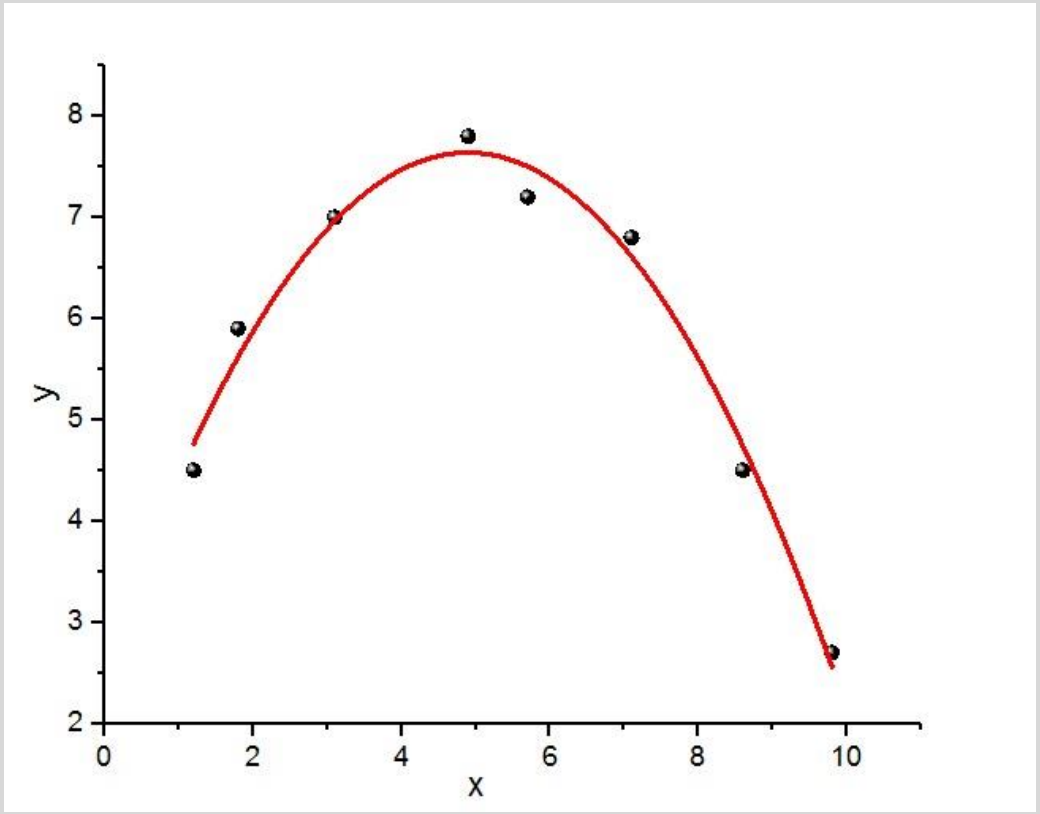
1448.988=291.2 a +2275.352 b +18971.9348 c

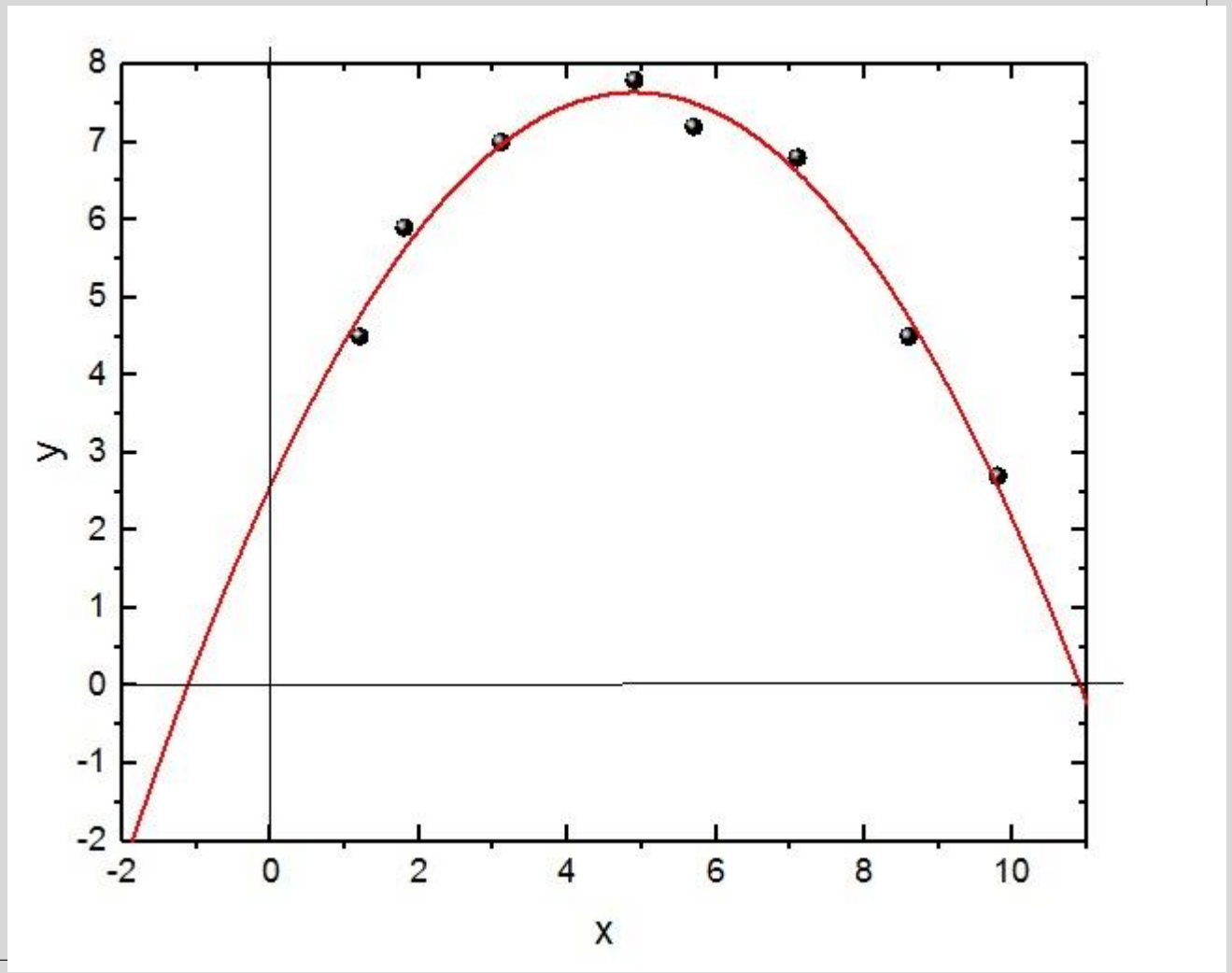
$$\begin{pmatrix} 46.4 \\ 230.42 \\ 1448.988 \end{pmatrix} = \begin{pmatrix} 8 & 42.2 & 291.2 \\ 42.2 & 291.2 & 2275.352 \\ 291.2 & 2275.352 & 18971.9348 \end{pmatrix} \begin{pmatrix} a \\ b \\ c \end{pmatrix}$$

$$\begin{pmatrix} a \\ b \\ c \end{pmatrix} = \begin{pmatrix} 1.56364 & -0.621284 & 0.0505119 \\ -0.621284 & 0.301467 & -0.0266196 \\ 0.0505119 & -0.0266196 & 0.00246996 \end{pmatrix} \begin{pmatrix} 46.4 \\ 230.42 \\ 1448.988 \end{pmatrix}$$

$$\begin{pmatrix} a \\ b \\ c \end{pmatrix} = \begin{pmatrix} 2.587773677 \\ 2.064967575 \\ -0.210993671 \end{pmatrix} \approx \begin{pmatrix} 2.5878 \\ 2.0650 \\ -0.2110 \end{pmatrix}$$

$$y = 2.5878 + 2.0650x - 0.2110x^2$$





Tarea

8.70. La Tabla 8-35 da las distancias de parada d (pies) de un automóvil que viaja a una velocidad v (millas por horas) en el instante que se observa el peligro. (a) Representar gráficamente d, v. (b) Ajustar una parábola de mínimos cuadrados de la forma $d = a + bv + cv^2$ a los datos. (c) Estimar d cuando $v = 45$ mi/h y 80 mi/h.

Tabla 8-35

Velocidad, v (mi/h)	20	30	40	50	60	70
Distancia de parada d(p)	54	90	138	206	292	396