
Mean
and
Linear
Models

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which can be considered as a constant only regression model.

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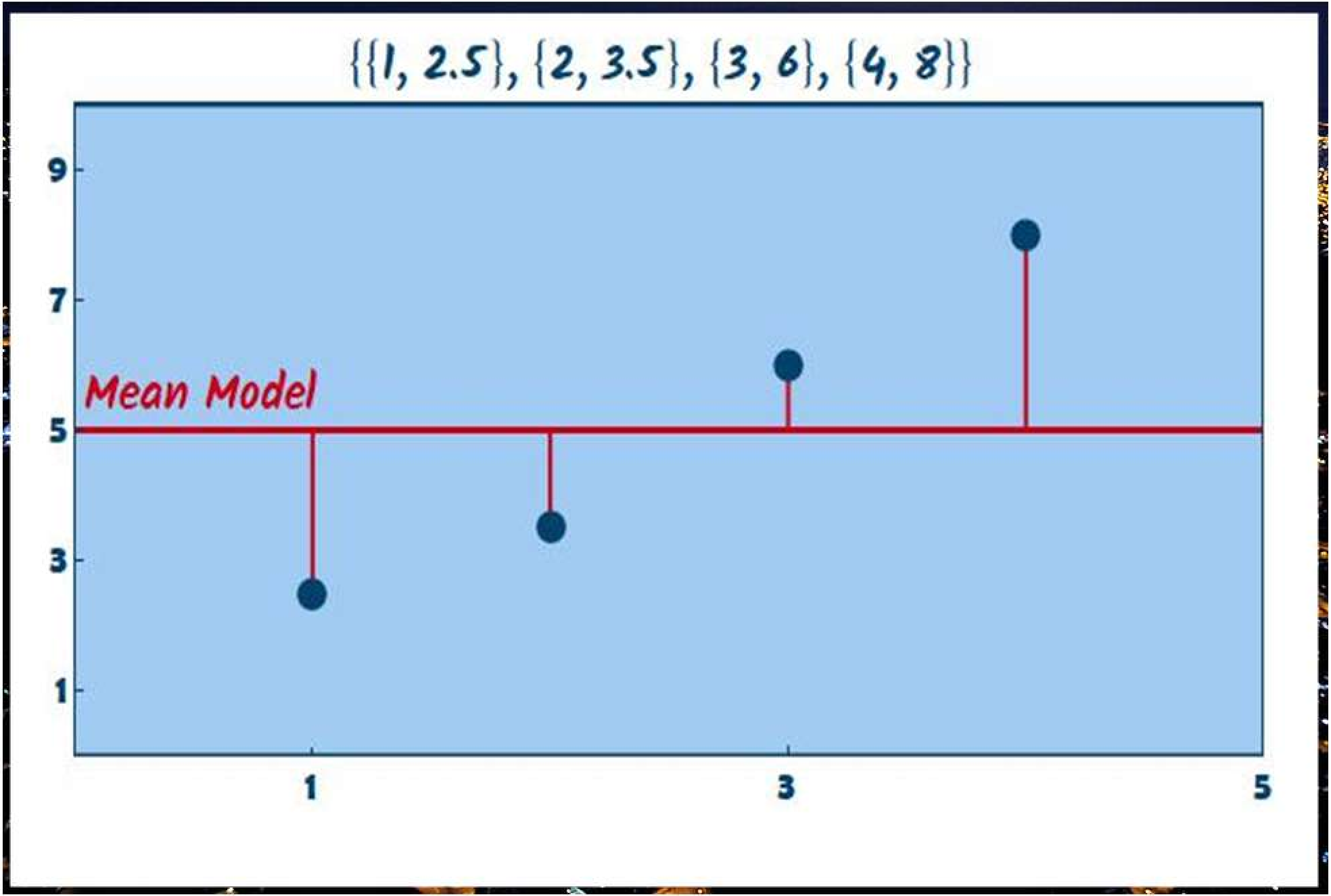
{{1, 2.5}, {2, 3.5}, {3, 6}, {4, 8}}
Mean Model
9
7
5
3
1
1
3
5

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$$\mathrm{Der}\left[\sum_{i=1}^{N}(\ a\ xi + b - yi\ )^2\ ,\ a\ \right] = 0\quad,\qquad \mathrm{Der}\left[\sum_{i=1}^{N}(\ a\ xi + b - yi\ )^2\ ,\ b\ \right] = 0$$

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$\{ a , b \}$ are the parameters around which the mean squared deviation of the data is

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$$\mathrm{Der}[\sum_{i=1}^{N} (a\,xi + b - yi)^2 , a] = 0 \quad , \quad \mathrm{Der}[\sum_{i=1}^{N} (a\,xi + b - yi)^2 , b] = 0$$

$$2 \sum_{i=1}^{N} (a\,xi + b - yi)\, xi = 0 \quad , \quad 2 \sum_{i=1}^{N} (a\,xi + b - yi) = 0$$

$$a < x^2 > + b < x > - < x\,y > = 0 \quad , \quad a < x > + b - < y > = 0$$

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$$a = \frac{<x\,y> - <x>\,<y>}{<x^2> - <x>^2} \quad , \quad b = \frac{<x^2><y> - <x>\,<x\,y>}{<x^2> - <x>^2}>$$

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$\{\ a\ ,\ b\ \}$ *are the parameters around which the mean squared deviation of the data is* **minimized**

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$$a = \frac{\langle x\ y\rangle - \langle x\rangle \langle y\rangle}{\langle x^2\rangle - \langle x\rangle^2} \quad , \quad b = \frac{\langle x^2\rangle\langle y\rangle - \langle x\rangle \langle x\ y\rangle}{\langle x^2\rangle - \langle x\rangle^2} >$$

$$y* = \frac{\langle x\ y\rangle - \langle x\rangle \langle y\rangle}{\langle x^2\rangle - \langle x\rangle^2}\ x\ + \frac{\langle x^2\rangle\langle y\rangle - \langle x\rangle \langle x\ y\rangle}{\langle x^2\rangle - \langle x\rangle^2}$$

$\{\{1, 2.5\}, \{2, 3.5\}, \{3, 6\}, \{4, 8\}\}$

$\langle x \rangle$: 2.5

$\langle y \rangle$: 5.0

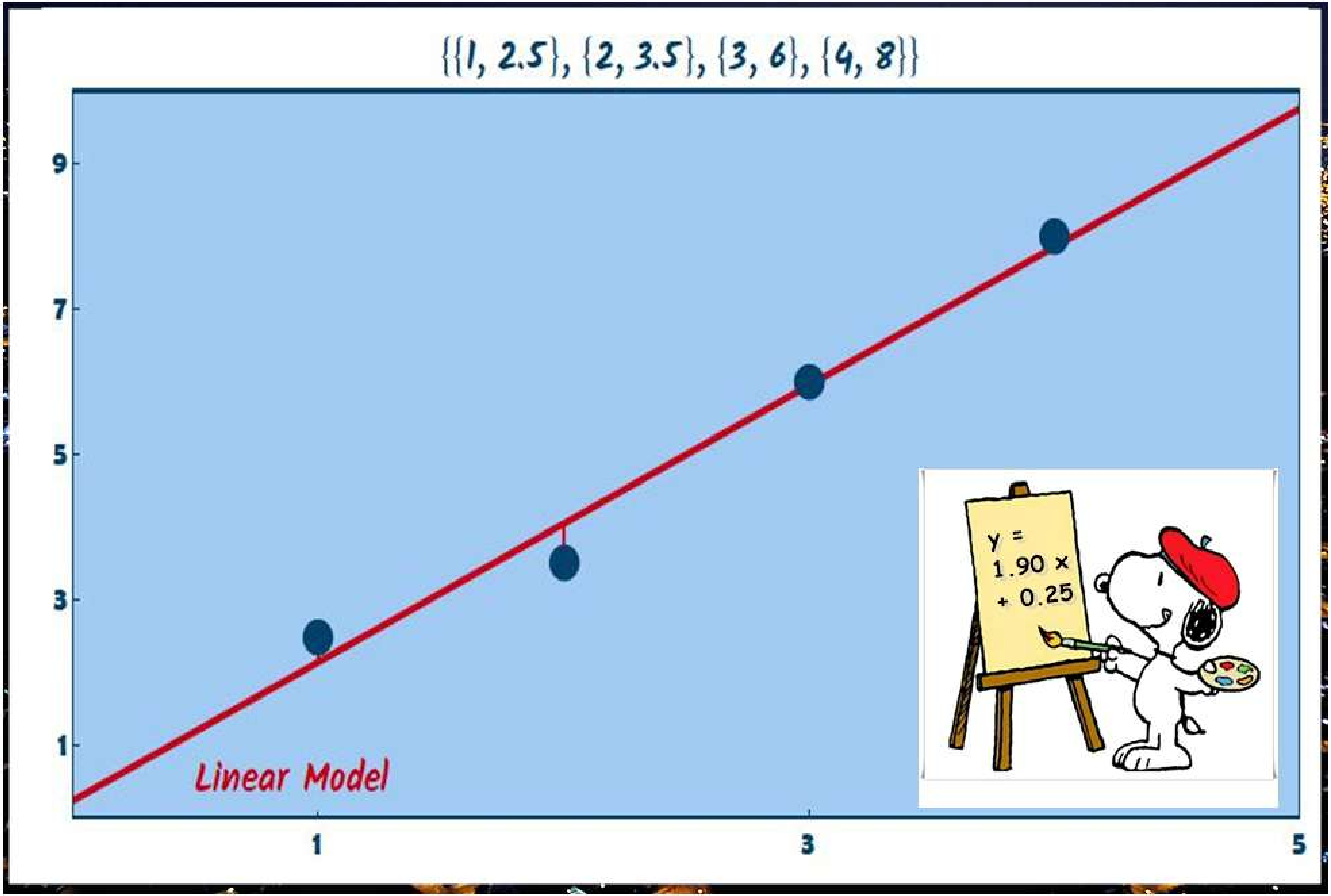
$\langle x\, y \rangle$: 14.875

$\langle x^2 \rangle$: 7.5

a : 1.90

b : 0.25

$$y* = \frac{\langle x\, y\rangle - \langle x\rangle\langle y\rangle}{\langle x^2\rangle - \langle x\rangle^2}\, x + \frac{\langle x^2\rangle\langle y\rangle - \langle x\rangle\langle x\, y\rangle}{\langle x^2\rangle - \langle x\rangle^2}$$



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Linear Model
y =
1.90 x
+ 0.25