Sponsored by the Clinical and Translational Science Institute (CTSI)
and the Department of Population Health Division of Biostatistics

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$$Y = \alpha + (\beta X)$$

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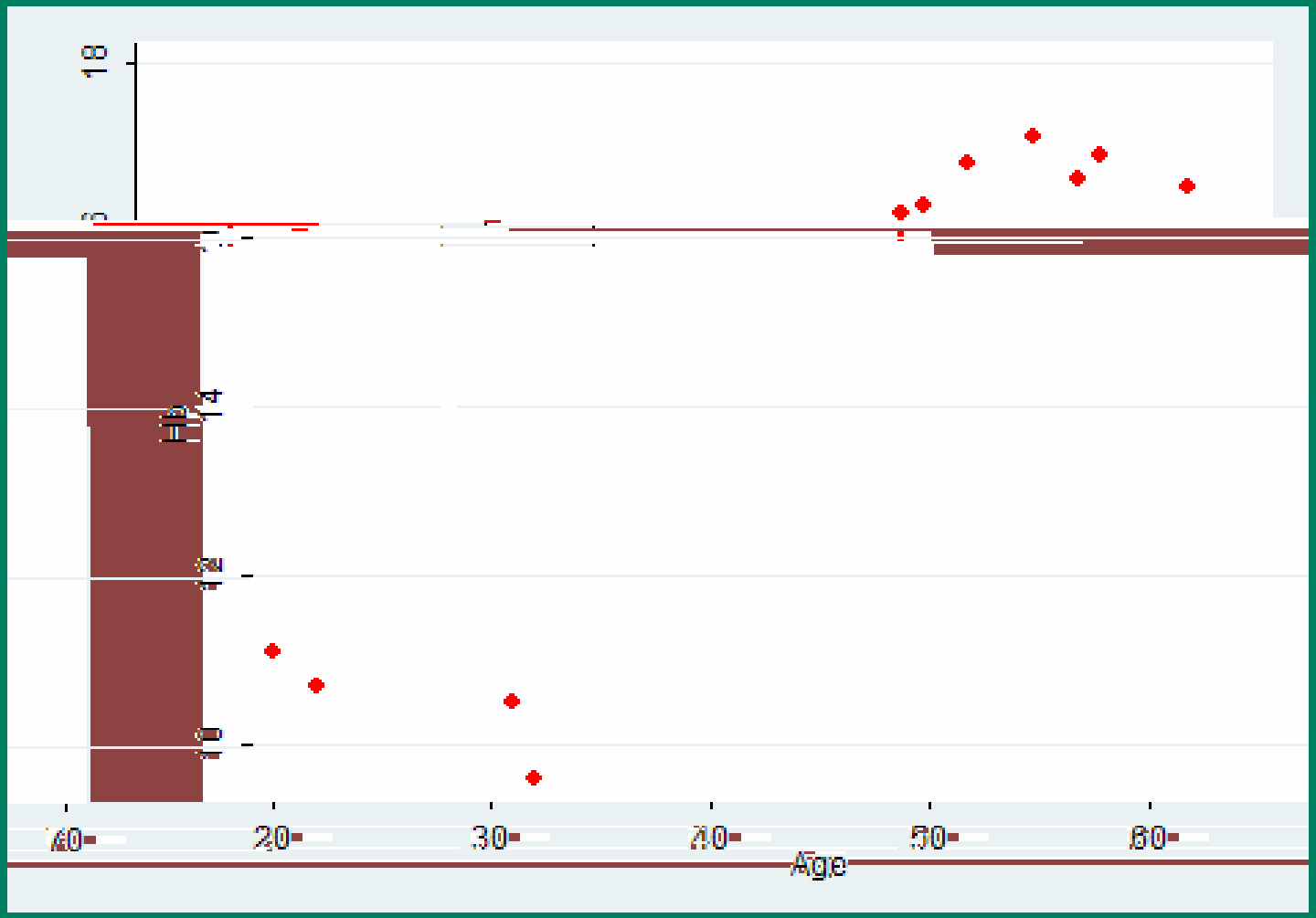
-

Hb

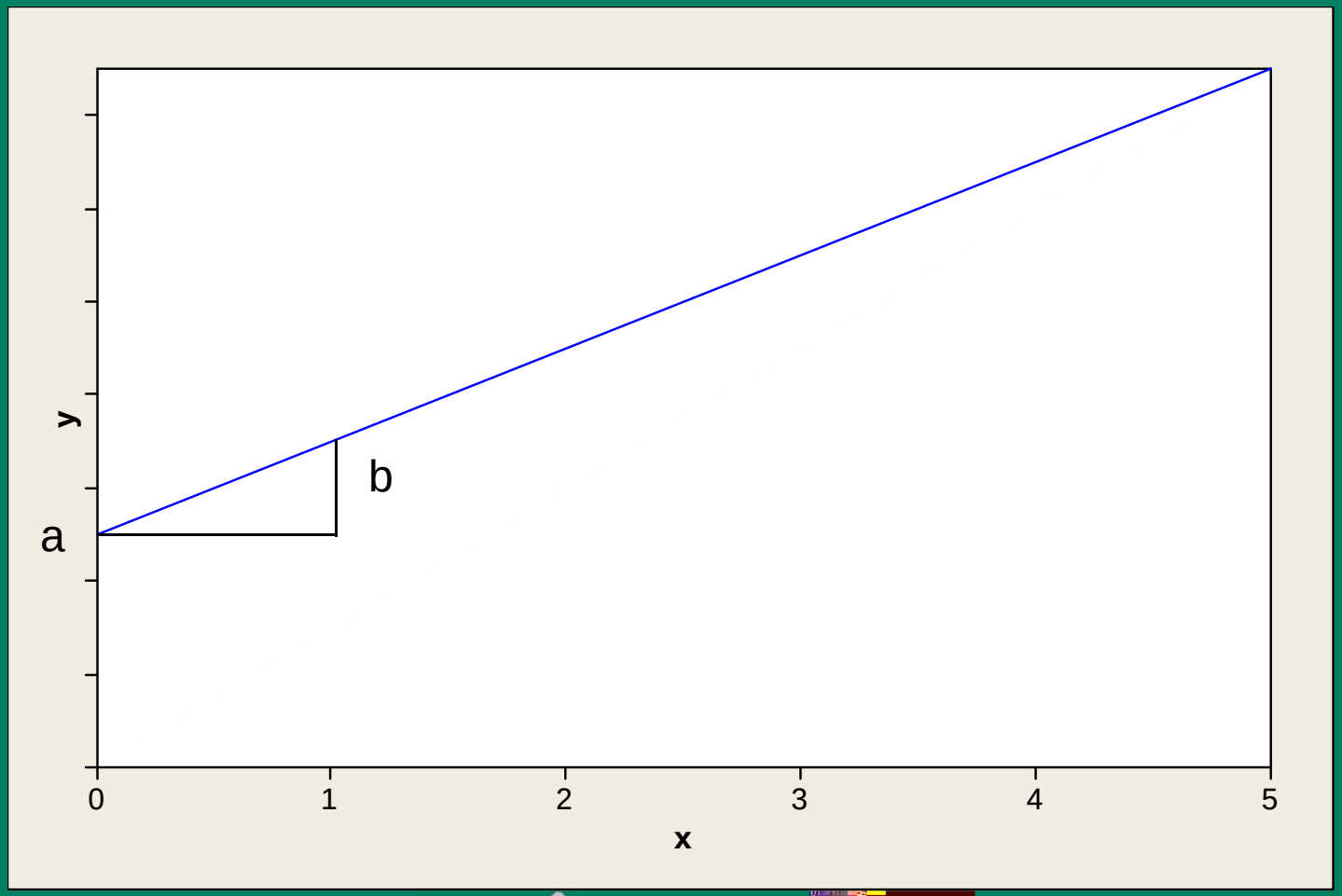
PCV

Age

- Hb
  Age
  - Hb Age
  - Hb
    Age
  -
-


18
14
12
10
Hb
20
30
40
50
60
Age

CTSI Biostatistics


y
a
b
0
1
2
3
4
5
x

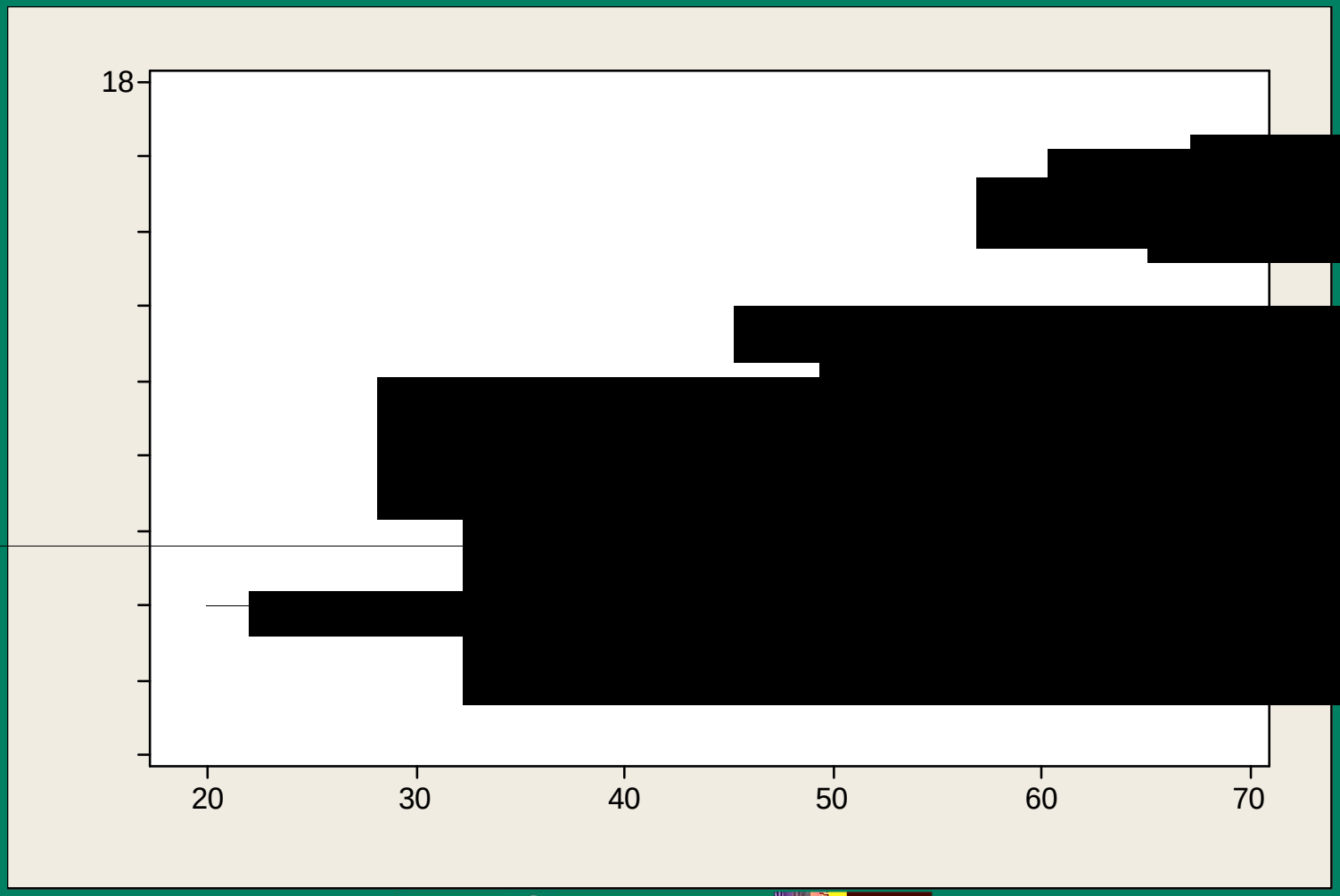
-
  – *Y*
- *Y* *on average* *X*
- *mean*
  Y *X*

-
  - $E(Y)=\alpha+\beta*X$
  - $E(Y)$: Y
  - α β
-
  - $E(Y)=a+b*X$
  - a b

-
- Y
  - y_i
  - $\hat{y}_i = a + bX_i$
  - $e_i = y_i - \hat{y}_i$
-

$$\sum_i (y_i - \hat{y}_i)^2 = \sum_i [y_i - (a + bX_i)]^2$$

CTSI Biostatistics


18
20
30
40
50
60
70

- *a* *b*

SAS, SPSS, STATA, MINITAB, …

- *a=8.24*
- *b=0.134*
- *Hb = 8.24 + 0.134 * Age*

- *a* *Y*

  X *0*

  – *a=8.24* *Hb*

  –

    - *Age*
    -

  –

- *b* *Y*

  X

  – *b=0.134* **Age**

    Hb

  –

- *a* *b*
- *a* *b*
  -
  -
  - *β*
  -

- ***b***

  SE(b)

- ***b***

  – ***T***

  – ***Z*** **≥**

  –

$$b \pm C_{\alpha/2} \times SE(b)$$

- $b \pm t \times SE(b)$
- ***t*** ***t***

  n-p

  - ***n***
  - ***p***

  –

- ***b=0.134 SE(b)=0.017***
-
- ***t=2.101***
-

$$0.134 \pm 2.101 \times 0.017 = [0.098, 0.170]$$

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Č

Age Hb

- *b*

  Y *X*
- *strong*
-
- *Age*

  Hb

- R^2

Y

X

- R^2

X

Y

- R^2

X

Y

- $R^2 = 77.4\%$

  Age 77.4%

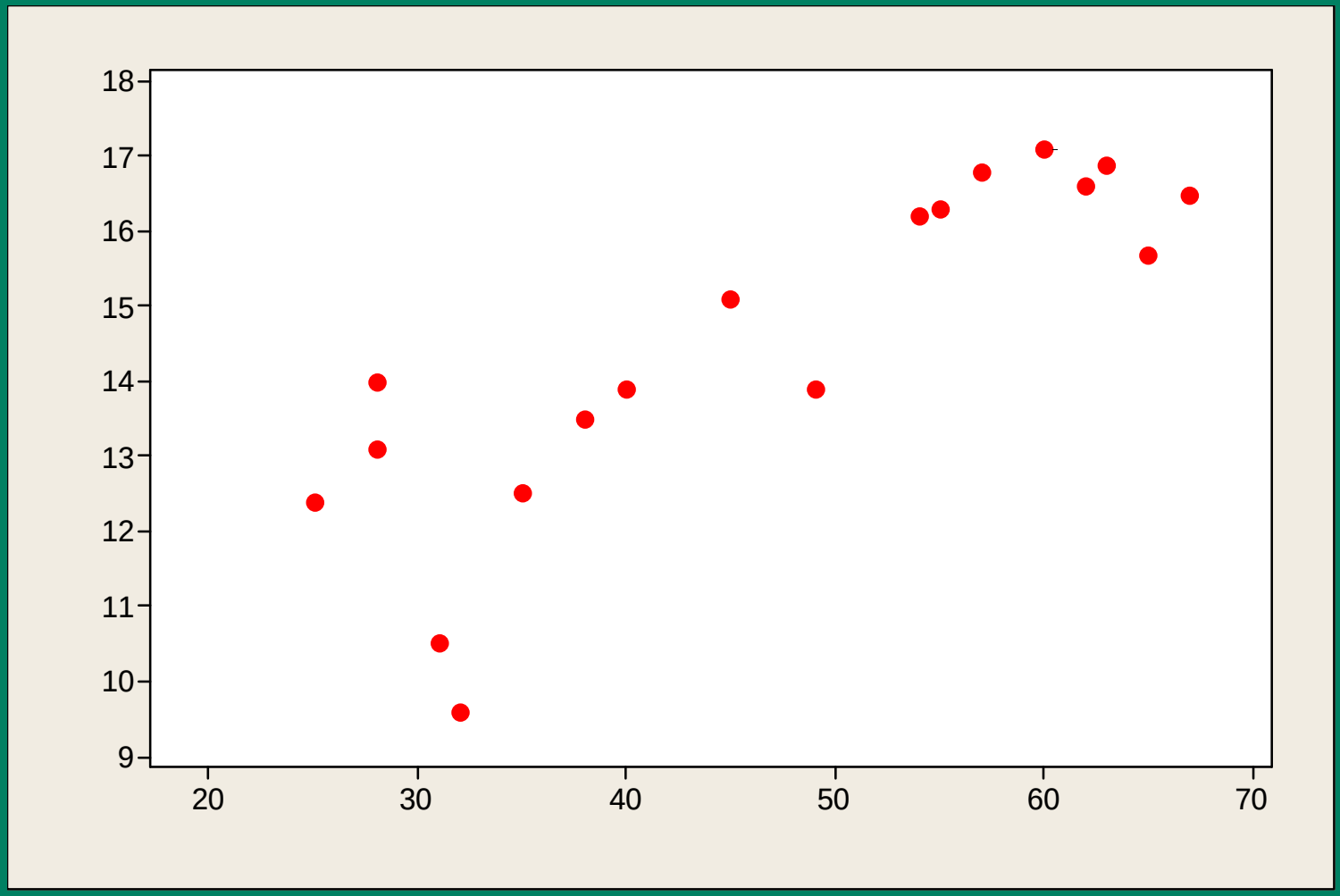
  Hb

- 22.6%

  –

  Hb

Sum of Squared Residuals Around Mean = 109.62)



-
  -
  -
-
  -
  - $R^2=1-0.226=74.4\%$

- r and direction
- R^2
- b
- R^2 r
- R22

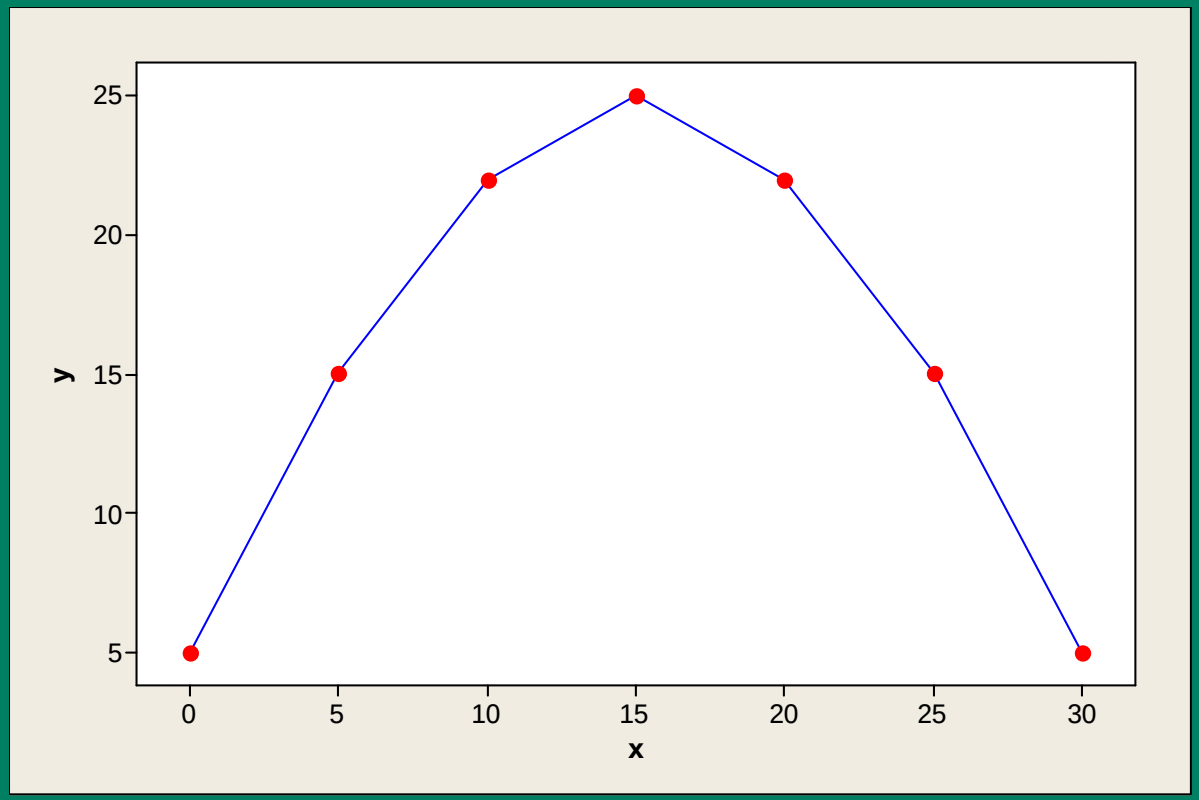
-
- *r*
-
-

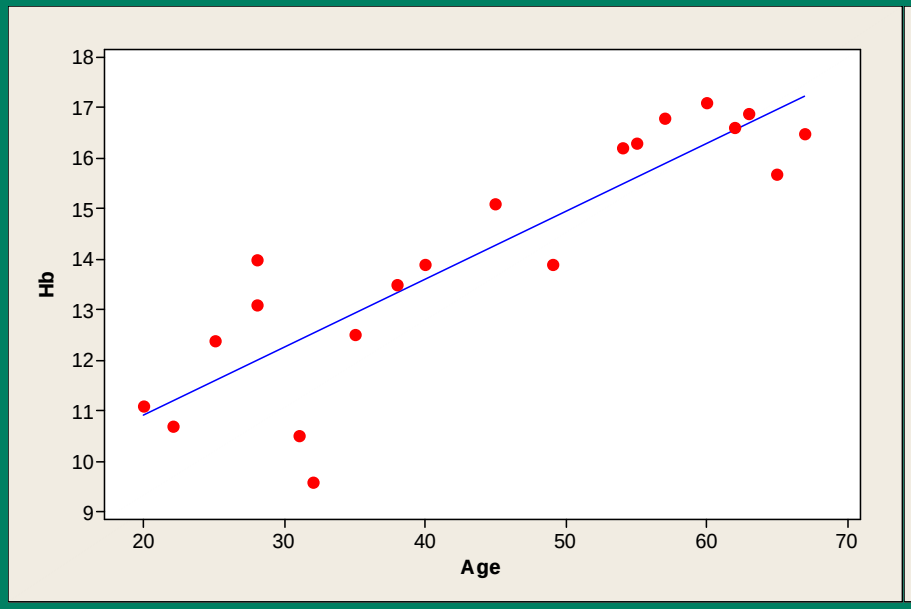
X

- *r* *R²*

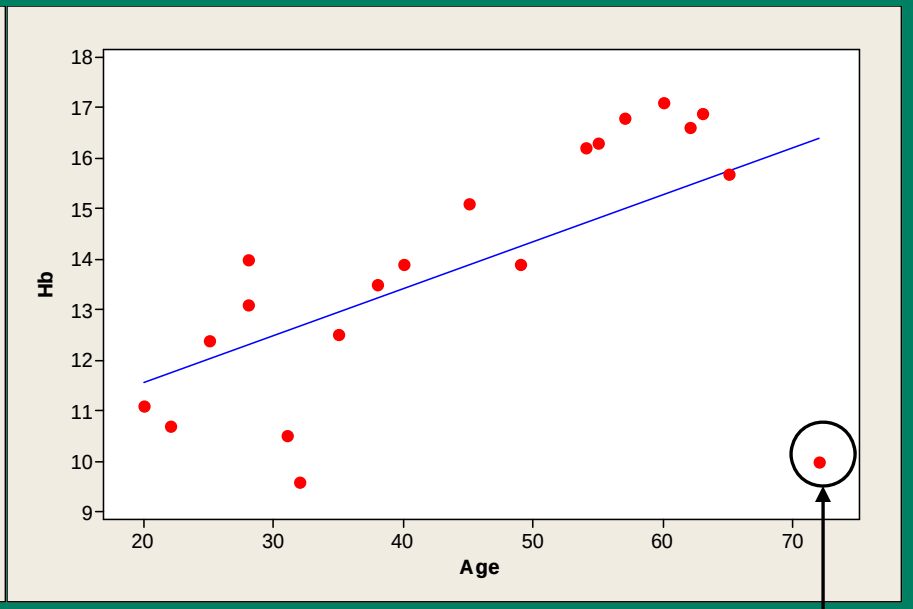
-

$b=0$, $r=0$, $R^2=0\%$





r=0.88



r=0.602

Outlier

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-
-

2/4/2009

- ***Linear regression***
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-
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  -

- ***b***
  -
  - ***r***
  - ***R^2***
- ***p-value***
  -
  -
  -

- ,
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-

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-