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

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  -

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

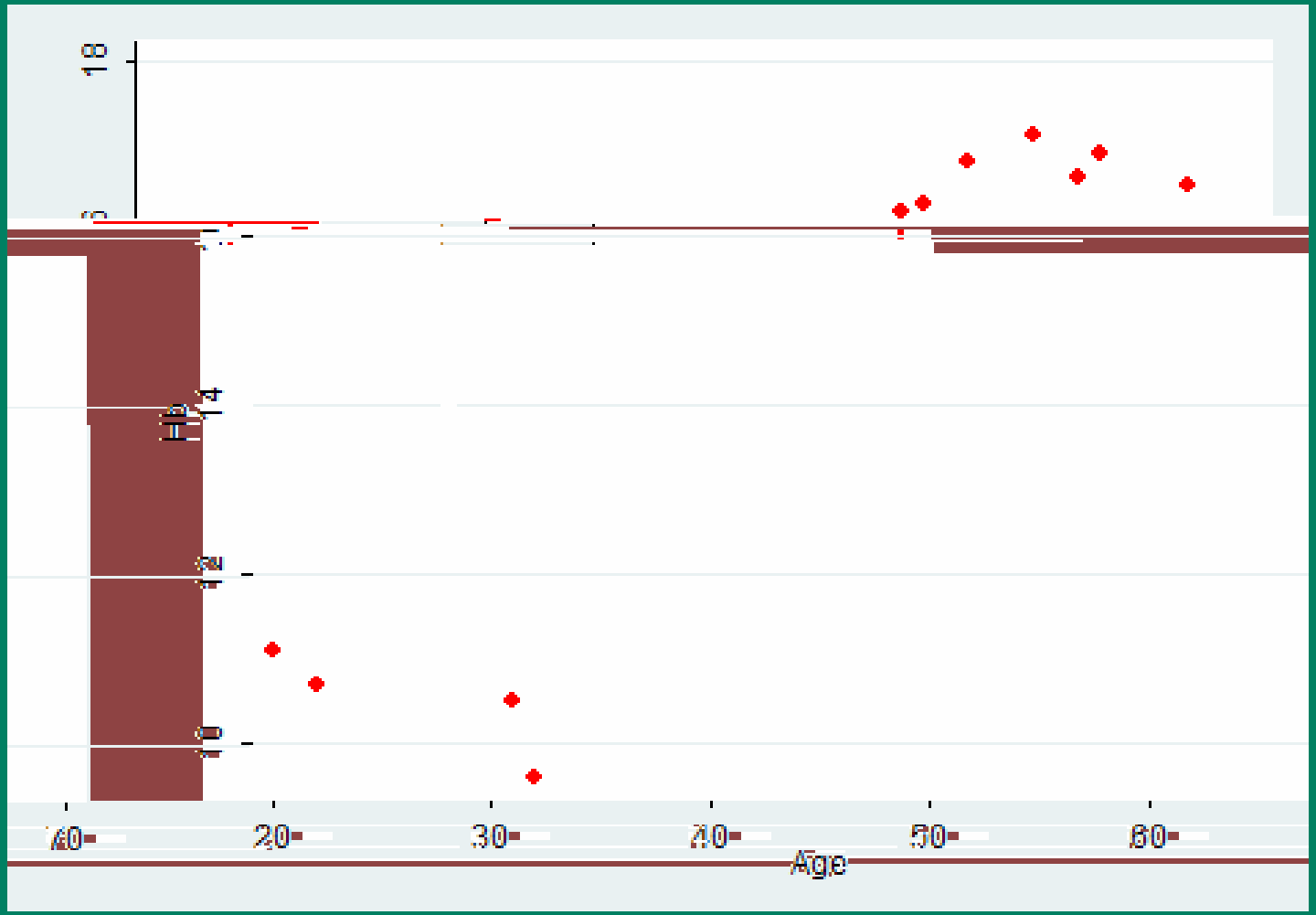
-
-
-
-

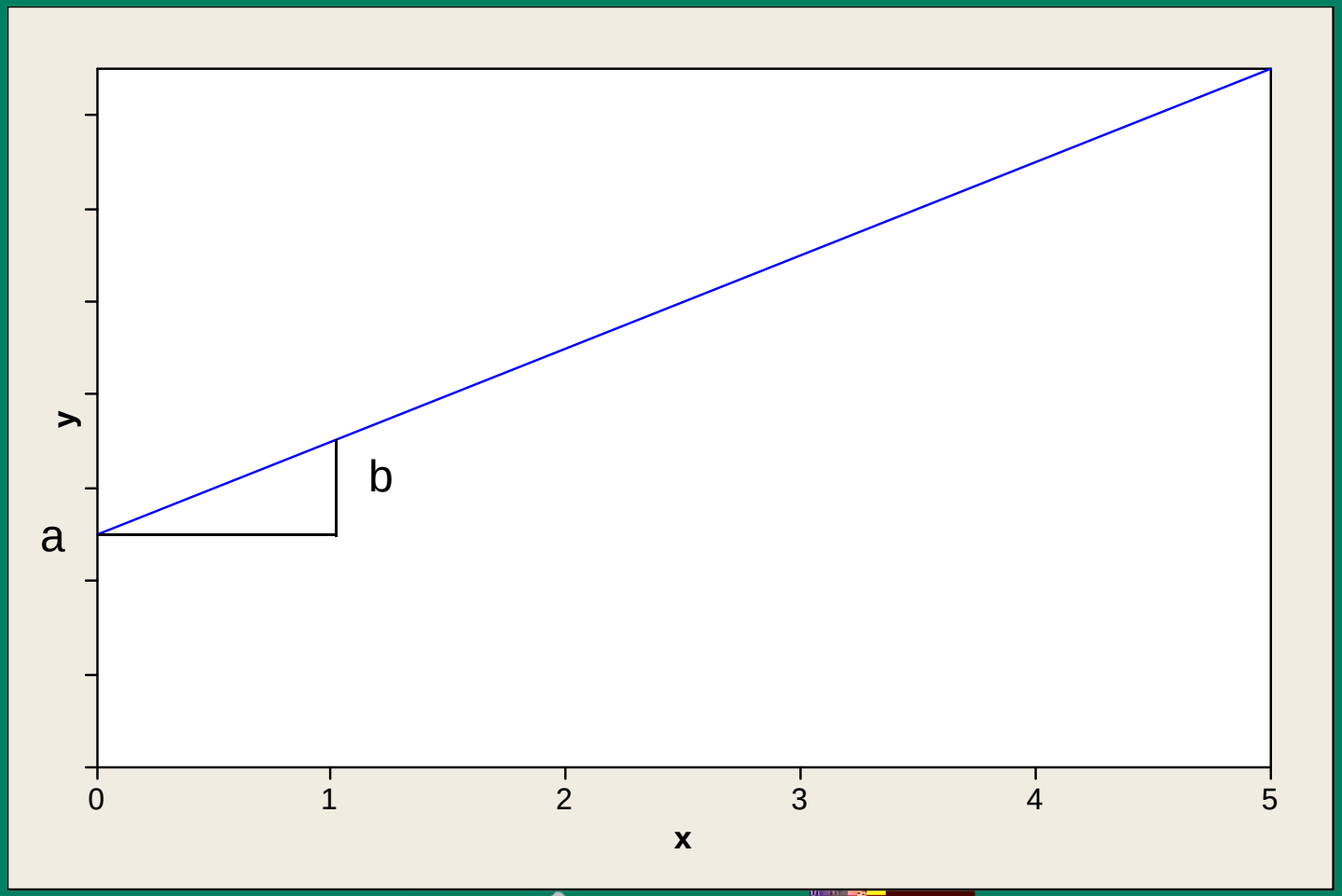
Hb

PCV

Age

- Hb
  - Age Hb Age
  - Hb
  - Age
-


18
14
12
10
Hb
20
30
40
50
60
Age

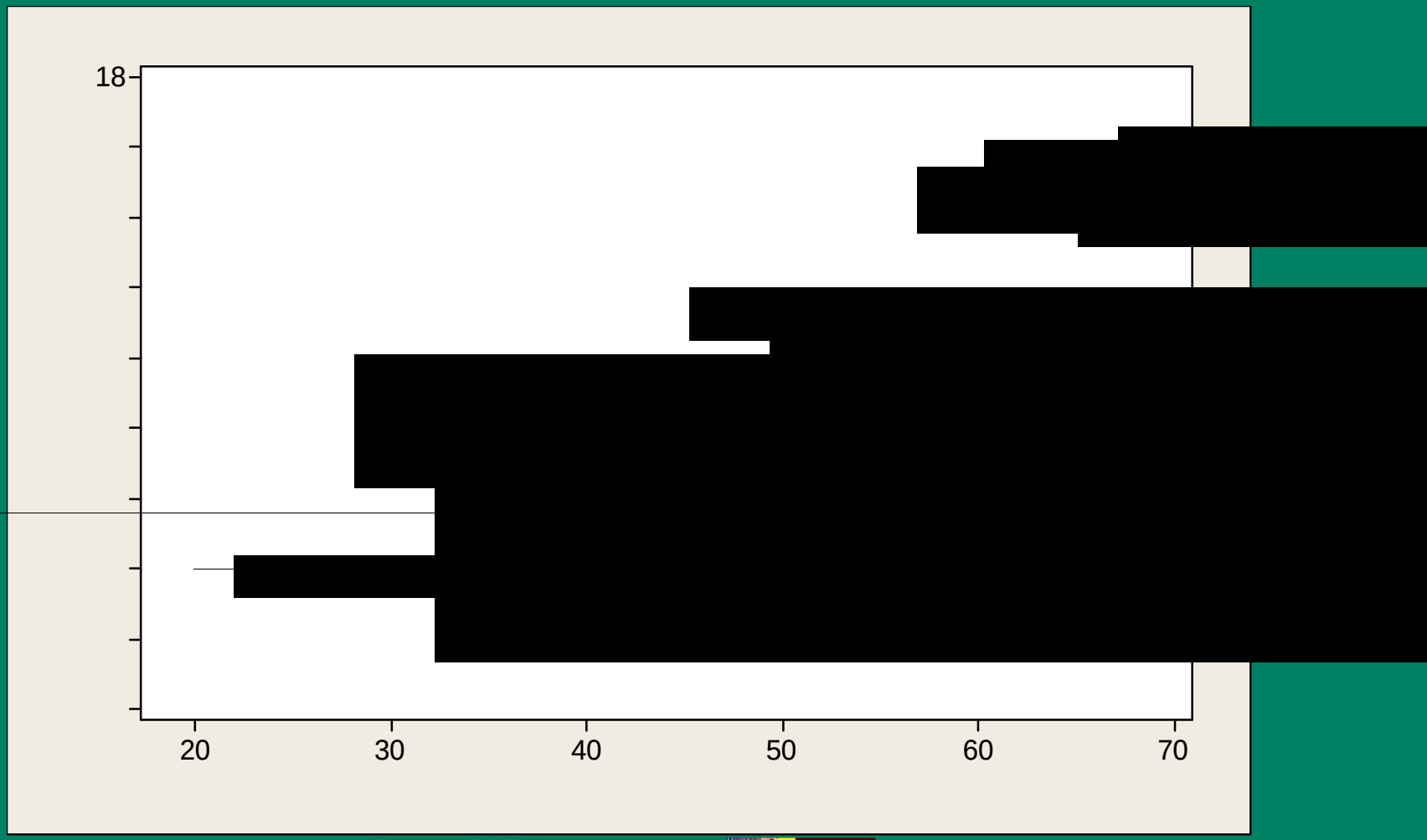

y
a
b
0
1
2
3
4
5
x

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

-
  - *E(Y)= + *X*
  - *E(Y):* *Y*
  -
-
  - *E(Y)=a+b*X*
  - *a* *b*

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

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


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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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%***

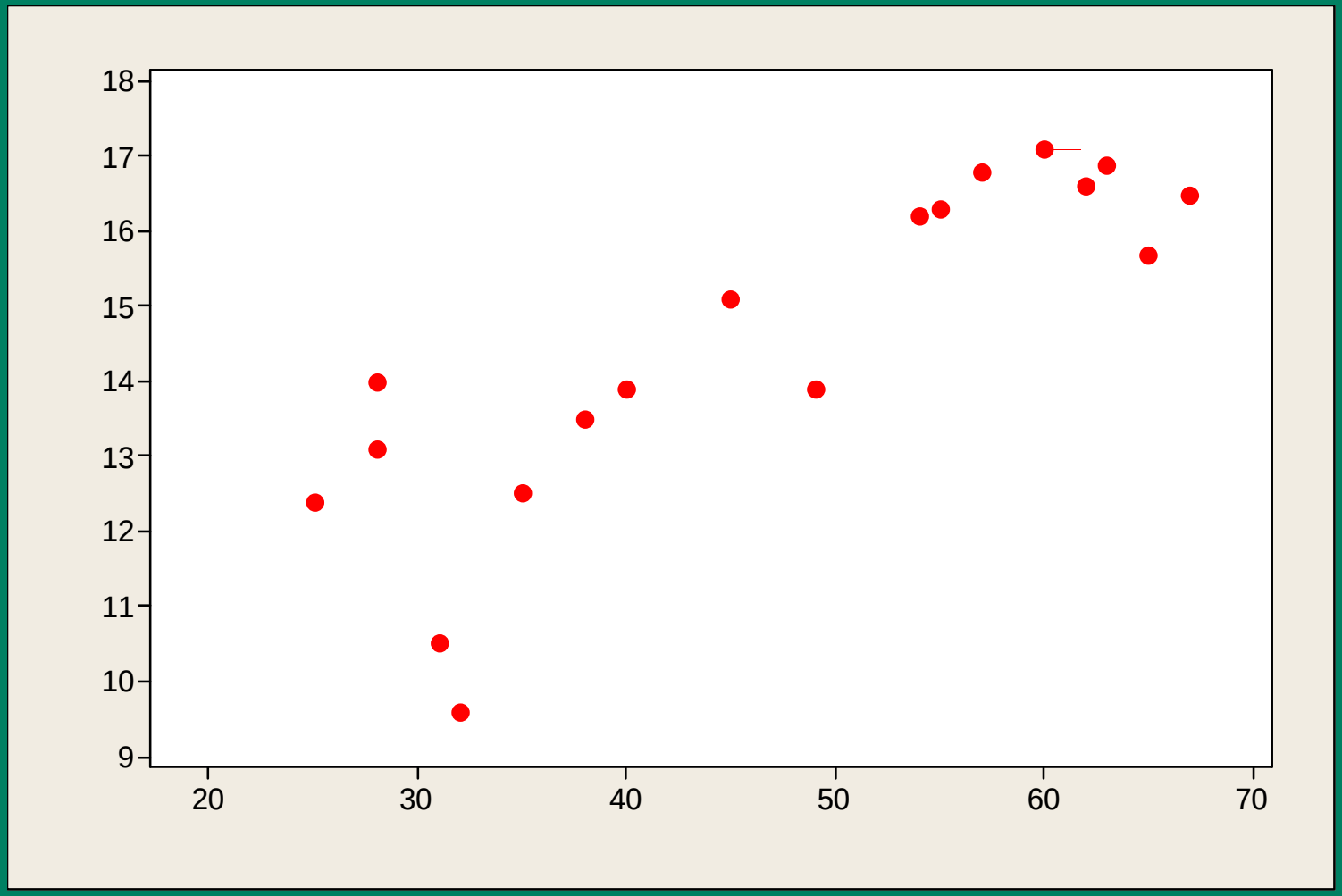
  Hb

- ***22.6%***

  –

  Hb

Sum of Squared Residuals Around Mean = 109.62)



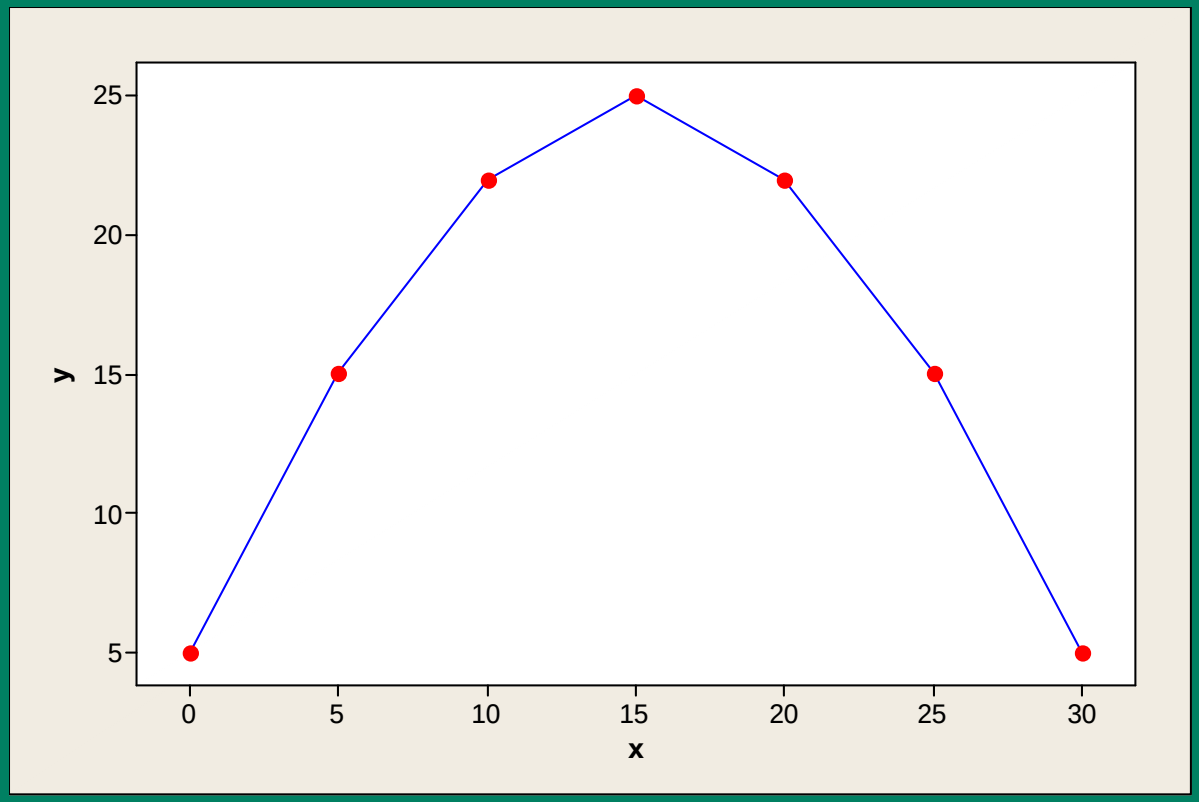
-
  -
  -
-
  -
  - $R^2=1-0.226=74.4\%$

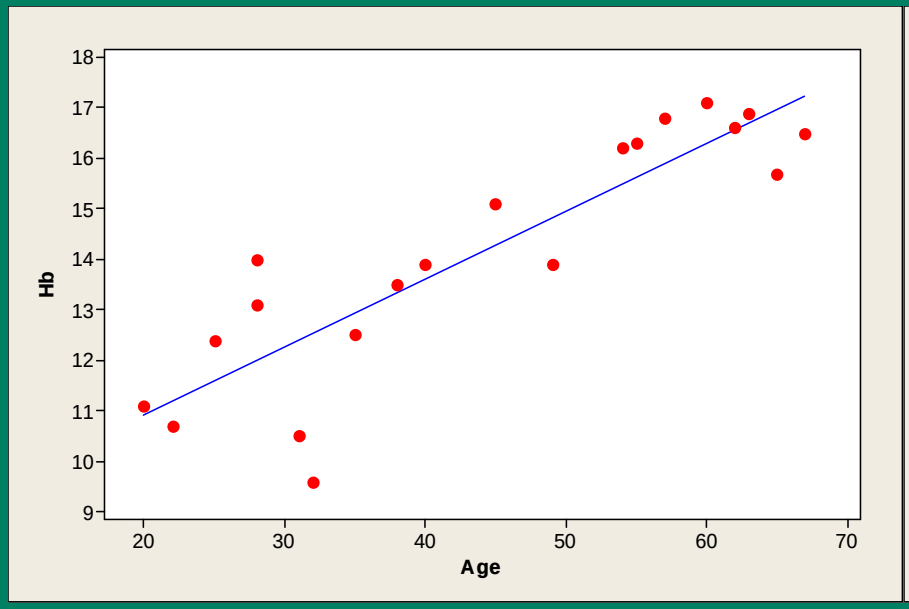
- ***r***
  and direction
- ***R^2***
  b
- ***R^2*** ***r***
- ***R22***

-
- ***r***
-
- ***X***
- ***r*** ***R^2***

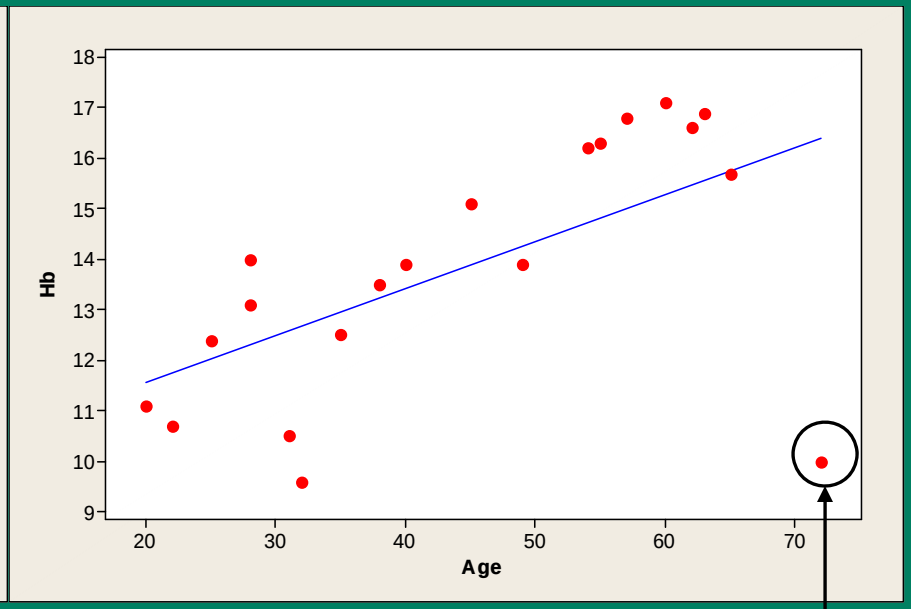
-

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





r=0.88



r=0.602

Outlier

2/4/2009

- ***Linear regression***
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-
  -
  -

- ***b***
  - ***r***

R^2

- ***p-value***
  -
-
  -
  -

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