Notes 9.1 & 9.2 Correlation & Linear Regression

Correlation

- A correlation is a comparison between 2 quantities
- The data can be represented by (x, y) where x is the independent "input" Domain variable, and y is the dependent, or output Range variable.
- One way to determine whether a linear correlation exists between two variables is to use a _____.

• Correlation Coefficient: "r"

Linear Regression "Test": how well do the data pts. make a line

Example 1:

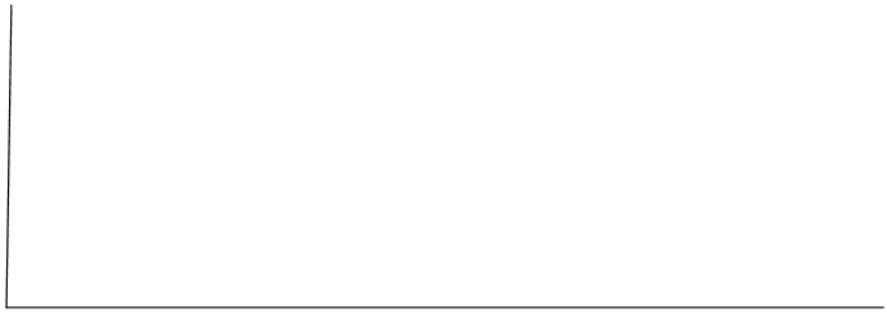
The number of hours 12 students spent online during the weekend and the scores of each student who took a test the following Monday are given below:

0 to 1 or 0 to -1

positive ↗ negative ↘

Hours spent online, x	0	1	2	3	3	5	5	5	6	7	7	10
Test score, y	96	85	82	74	95	68	76	84	58	65	75	50

a. Sketch a graph of the distribution and then describe the distribution.



b. Find the regression line.

c. Find the correlation coefficient.

d. Use the regression line to predict the test scores given the time online:

x = 4 hours x = 9 hours x = 15 hours

Notes 9.1 & 9.2 Correlation & Linear Regression

Example 2:

The budgets & worldwide grosses of 15 of the most expensive 20th Century Fox Movies are shown.

Budget, x (millions)	200	150	125	125	115	115	115	110	110	110	105	102	100	100	100
Gross, y (millions)	1835.4	459.4	406.4	542.7	924.3	656.7	848.5	571.1	211.4	150.5	348.8	358.8	365.3	359.1	249.0

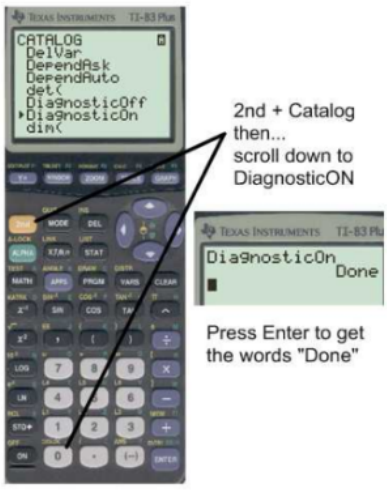
a. Sketch a graph of the distribution and then describe the distribution.

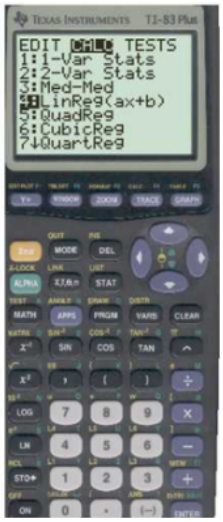
b. Find the regression line.

c. Find the correlation coefficient.

d. Use the regression line to predict the gross amount of money for the given budget:

$120,000,000 *$93,000,000*





Notes 9.1 & 9.2 Correlation & Linear Regression

Correlation

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- The data can be represented by (x, y) where x is the independent input domain variable, and y is the dependent output range variable.
- One way to determine whether a linear correlation exists between two variables is to use a Linear Regression "the line of Best Fit" * regression line

Example 1:

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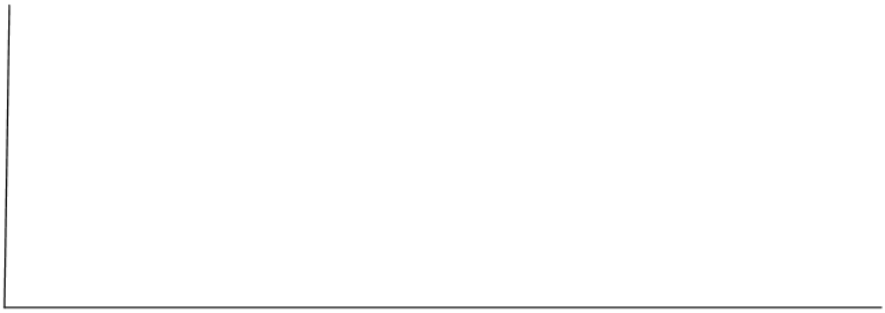

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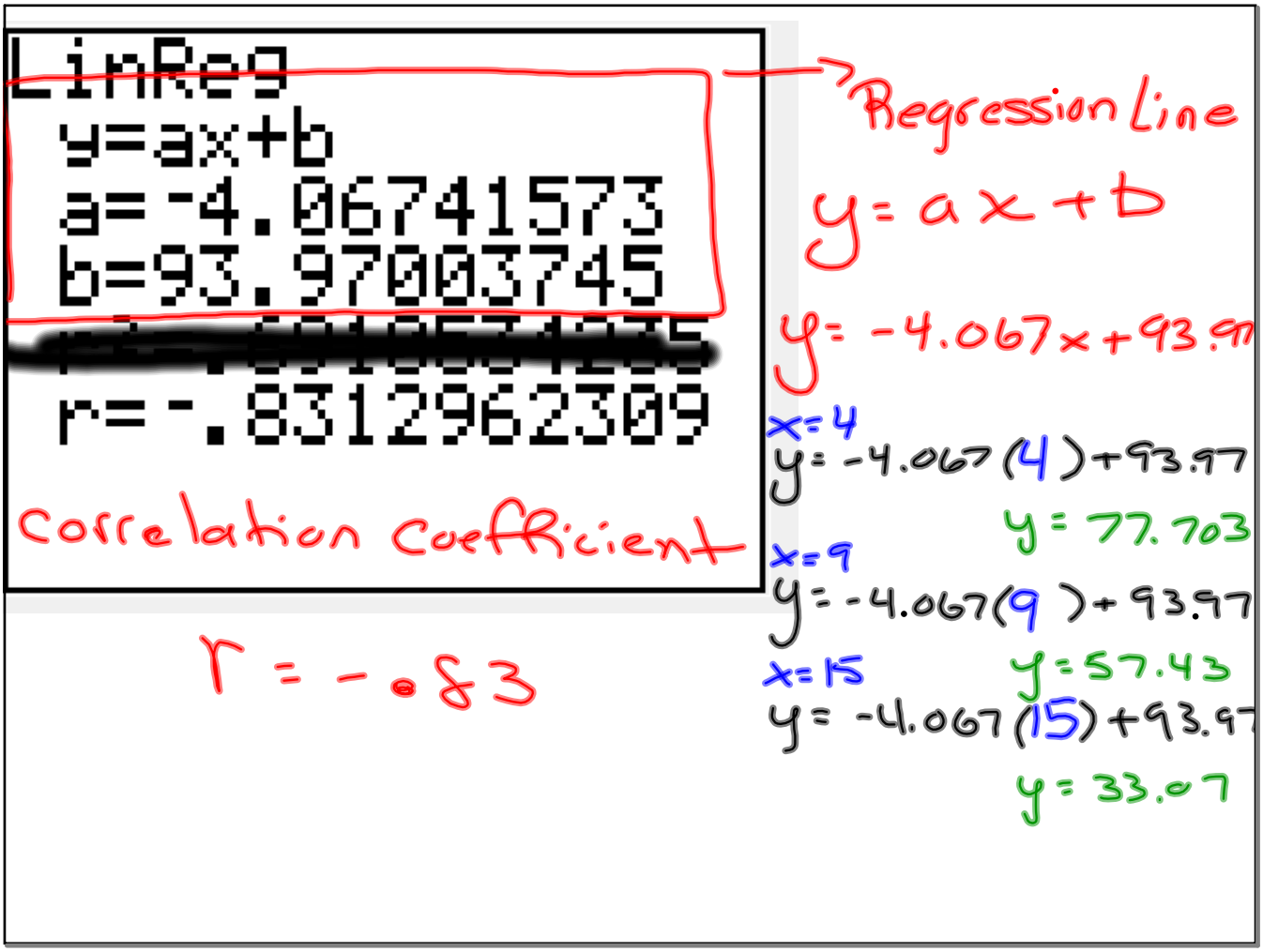
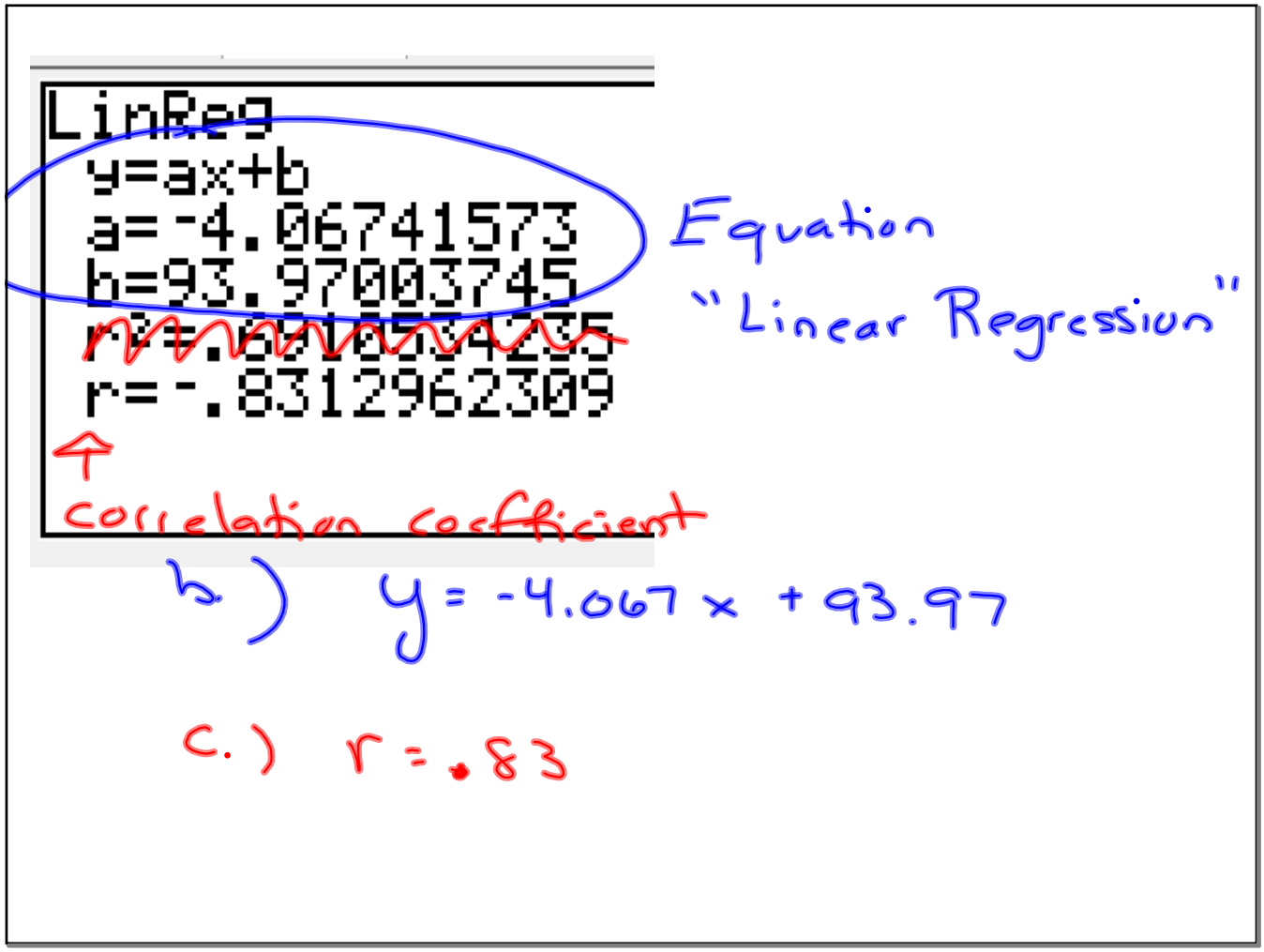
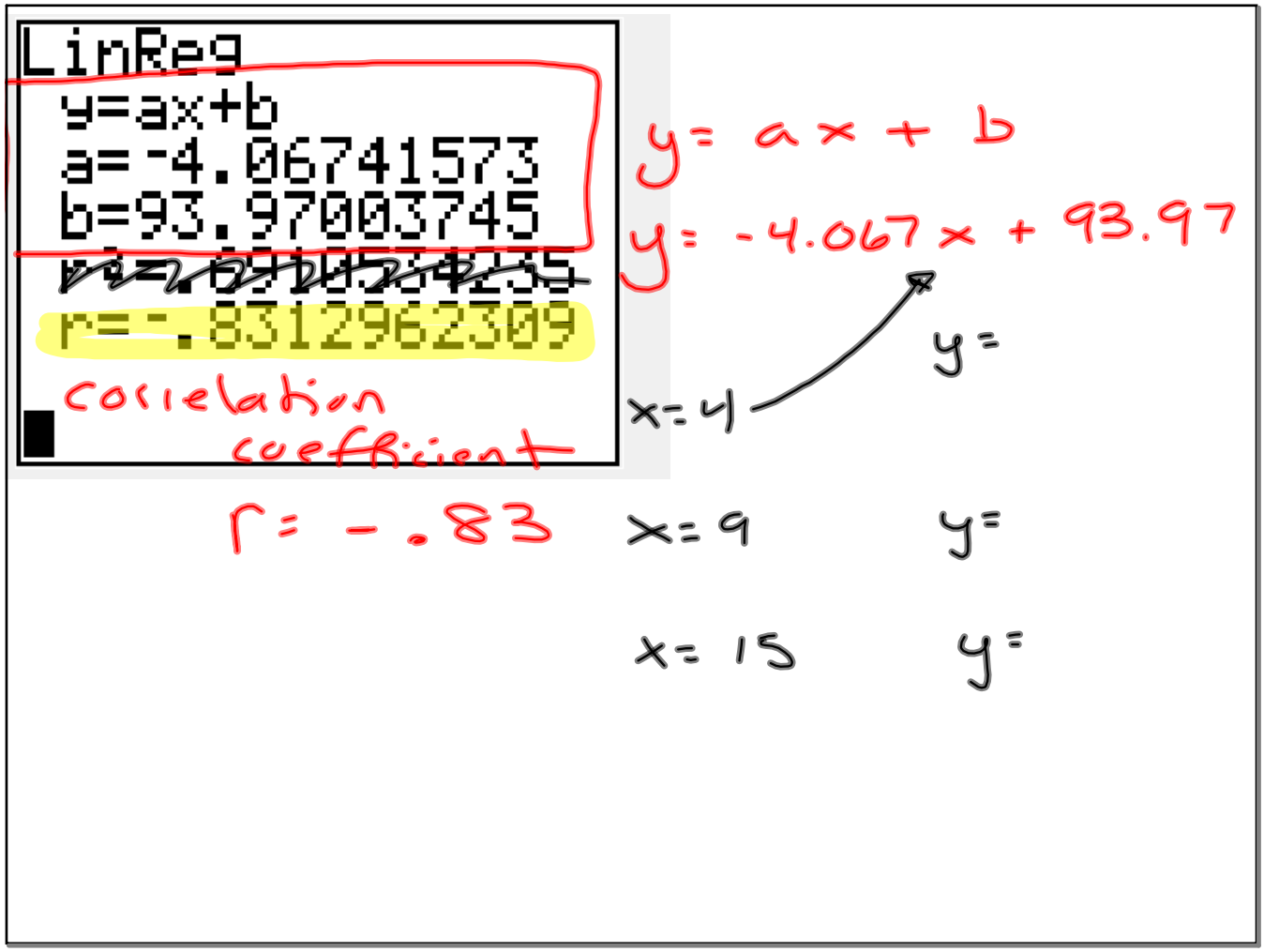

LinReg
y=ax+b
a=-4.06741573
b=93.97003745
r=-.8312962309
correlation coefficient
r = -.83
Regression Line
y = ax + b
y = -4.067x + 93.97
x=4
y = -4.067(4) + 93.97
y = 77.703
x=9
y = -4.067(9) + 93.97
y = 57.43
x=15
y = -4.067(15) + 93.97
y = 33.07


LinReg
y=ax+b
a=-4.06741573
b=93.97003745
r²=.6910534235
r=-.8312962309
correlation coefficient
Equation
"Linear Regression"
b.) y = -4.067x + 93.97
c.) r = .83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r=-.8312962309
correlation coefficient
y = a x + b
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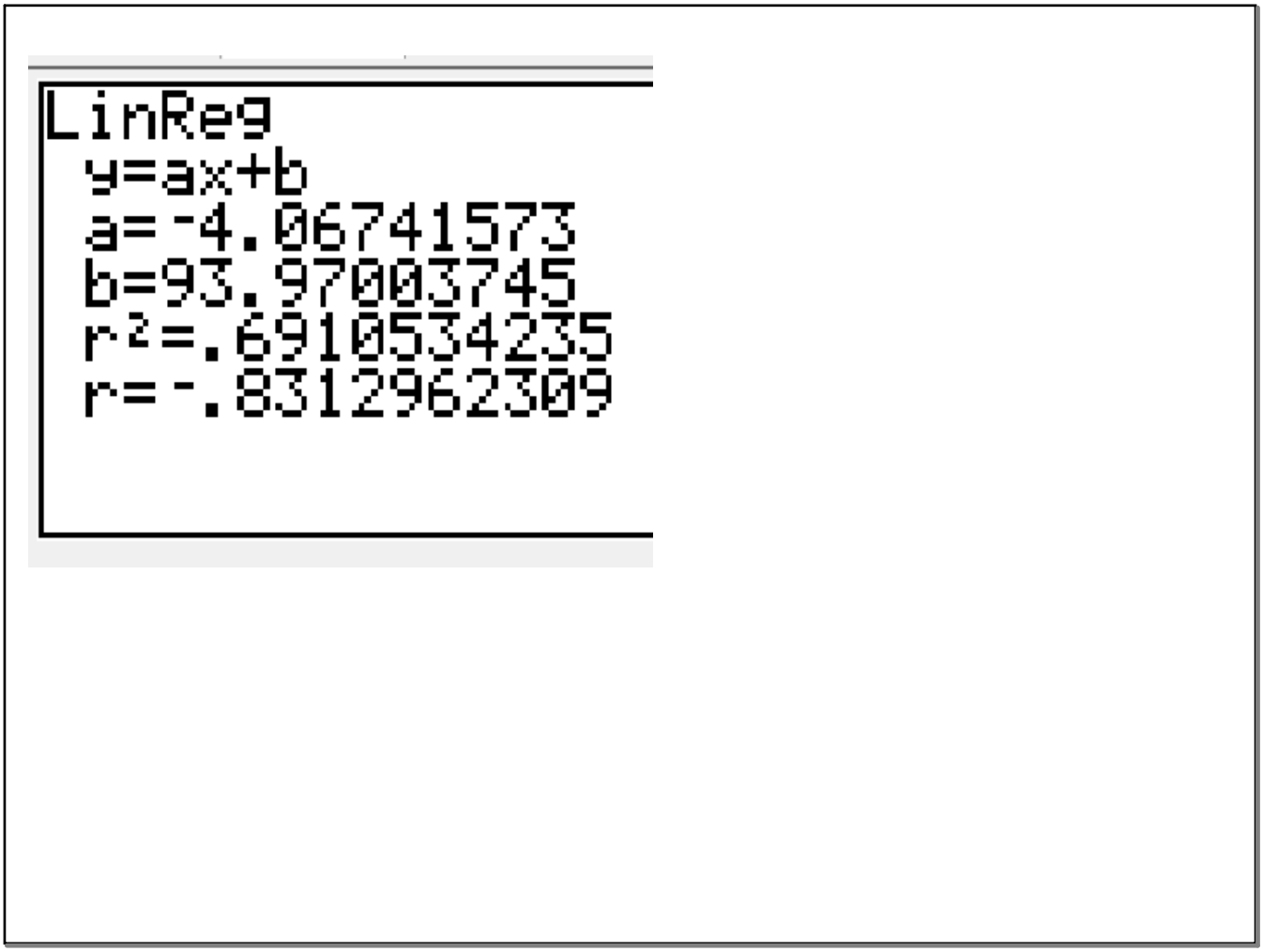
x = 4
y =
r = -.83
x = 9
y =
x = 15
y =


LinReg
y=ax+b
a=-4.06741573
b=93.97003745
r²=.6910534235
r=-.8312962309

Jan 4-8:01 AM

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domain

range

*Regression Line

Linear Regression "Test"

"the line of best fit"

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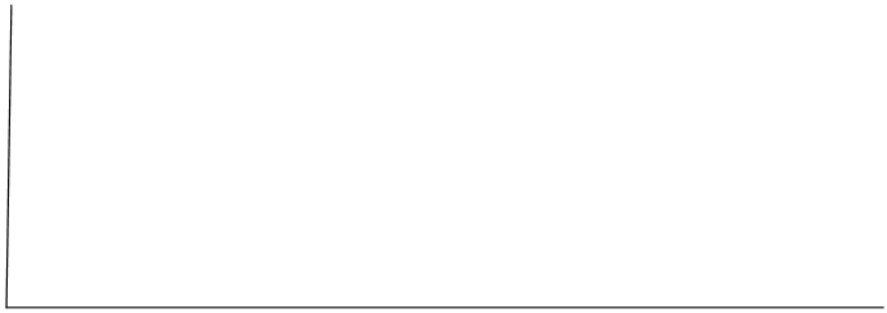

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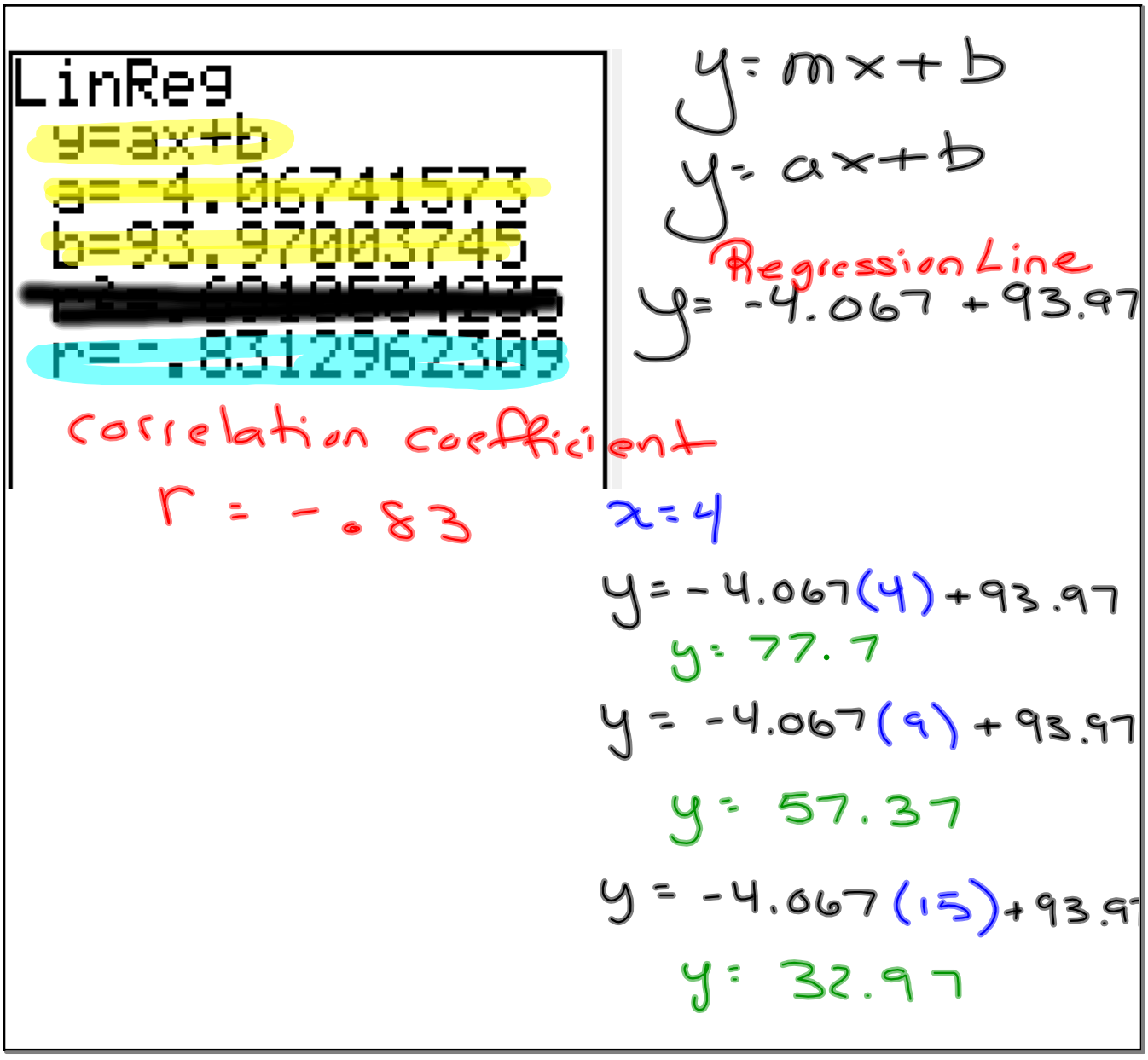
d. Use the regression line to predict the test scores given the time online:

x = 4 hours x = 9 hours x = 15 hours


LinReg
y=ax+b
a=-4.06741573
b=93.97003745
r=-.8312962309
correlation coefficient
r = -.83
y = mx + b
y = ax + b
Regression Line
y = -4.067 + 93.97
x = 4
y = -4.067(4) + 93.97
y = 77.7
y = -4.067(9) + 93.97
y = 57.37
y = -4.067(15) + 93.9
y = 32.97

Jan 4-10:42 AM

Notes 9.1 & 9.2 Correlation & Linear Regression

Example 2:

The budgets & worldwide grosses of 15 of the most expensive 20th Century Fox Movies are shown.

Budget, x (millions)	200	150	125	125	115	115	115	110	110	110	105	102	100	100	100
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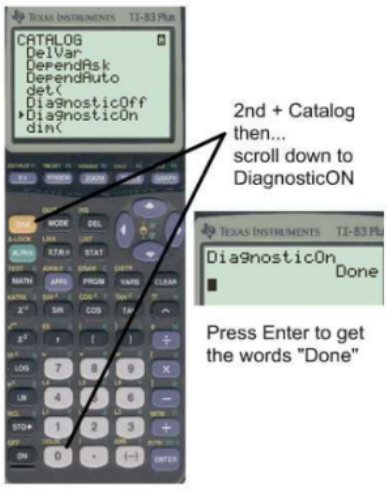

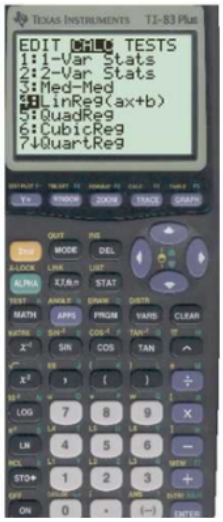

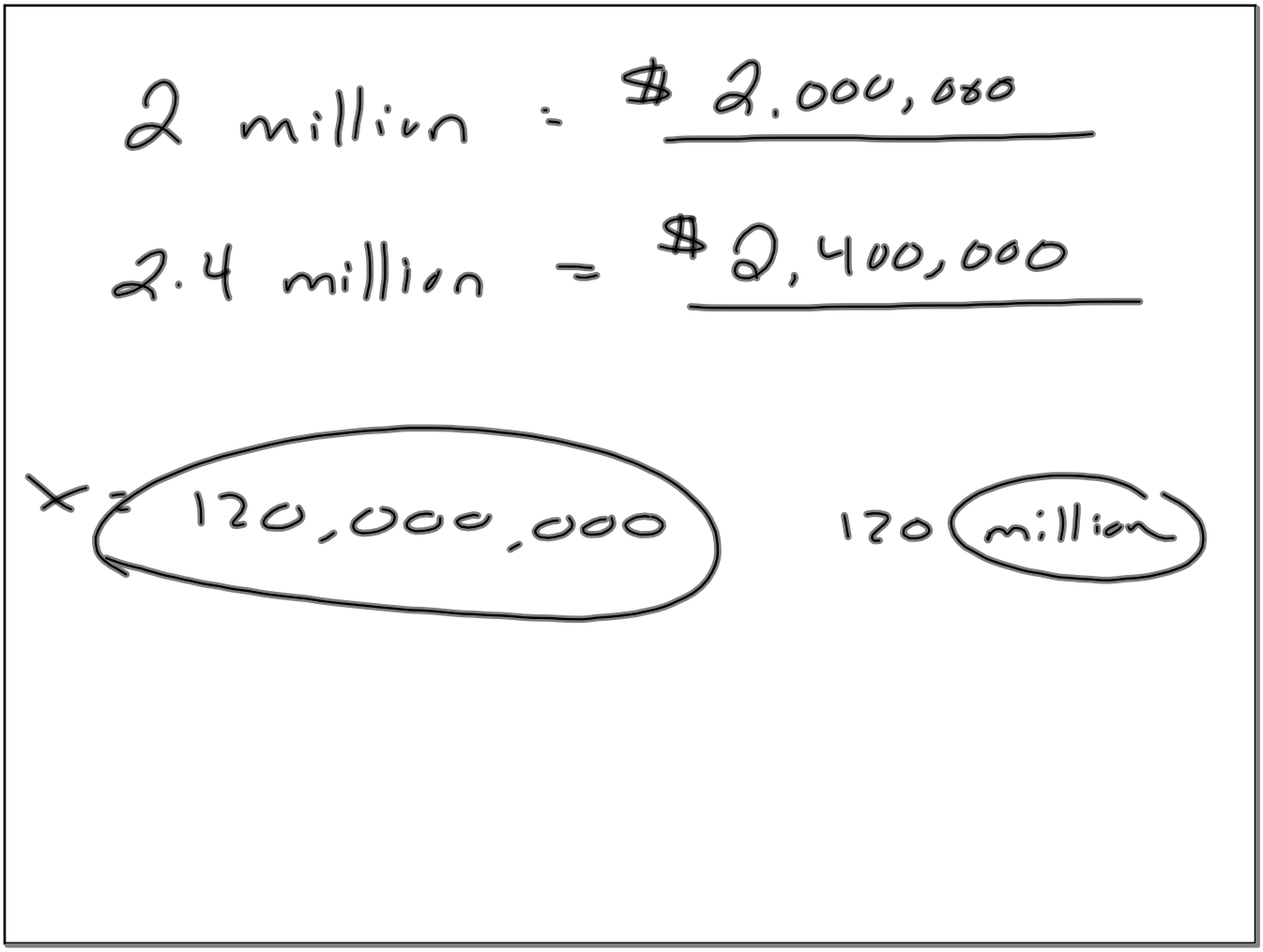
2 million = $2,000,000
2.4 million = $2,400,000
x = 120,000,000
120 million

Jan 4-2:05 PM