semi-log slope = -.477

$\log_{10} G = -.477t + b$

$10^{\log_{10} G} = 10^{-.477t + b}$

$G = (10^{-.477t})(10^{b})$

$G = (10^{b})(10^{-.477t})$

$10{,}000 = 10^{b}(1)$ $t=0$

Sept 14

a) $G = (10{,}000)10^{-.447t}$

b) $100 = 10{,}000 \; 10^{-.447t}$

$.01 = 10^{-.477t}$

$\log_{10} .01 = \log_{10} 10^{-.477t}$

$\log_{10}(.01) = -.477t$

$\frac{\log_{10}(.01)}{-.477} = t$ $t \approx 4.5 \text{yr}$

MATH 151 - notes, **Lenhart**

Correlation coefficient $\rho = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}}$

$S_{xx} = \sum_{i=1}^{n}(x_i - \bar{x})^2$ and $S_{yy} = \sum_{i=1}^{n}(y_i - \bar{y})^2$

$$S_{xy} = \sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})$$

Sum of the residuals squared (squaring the vertical distance from the data points to the y-values on the linear regression line)

$$\text{RES} = \sum_{i=1}^{n}(y_i - \hat{y}_i)^2$$

Total Sum of Squares (TSS) of the data set

$$\text{TSS} = S_{yy} = \sum_{i=1}^{n}(y_i - \bar{y})^2,$$

Sum of Squares of the Regression (SSR)

$$\text{SSR} = \sum_{i=1}^{n}(\hat{y}_i - \bar{y})^2,$$

where $\hat{y}_i$ is the point on the regression line that corresponds with x_i.

TSS = RES + SSR and TSS $\geq$ SSR.

Coefficient of determination

$$R^2 = \frac{\text{SSR}}{\text{TSS}}.$$

Numerator measures the variation of the y-values obtained by the linear regression line from the mean of the y-data points. Denominator measures the variation of the y-data values from the mean of the y-data points.

$$R^2 \leq 1$$

$R^2 \approx 1$ means HIGHLY correlated pts.; linear regression line is a good fit

$$R^2 = \rho^2$$

If $R^2 = .72$ from a set of data points, we say that the linear regression line explains 72% of the variation in the data from the mean.

Example $(1,3), (2,11), (3,28)$
Data

$\bar{x} = 2 \qquad \bar{y} = 14$

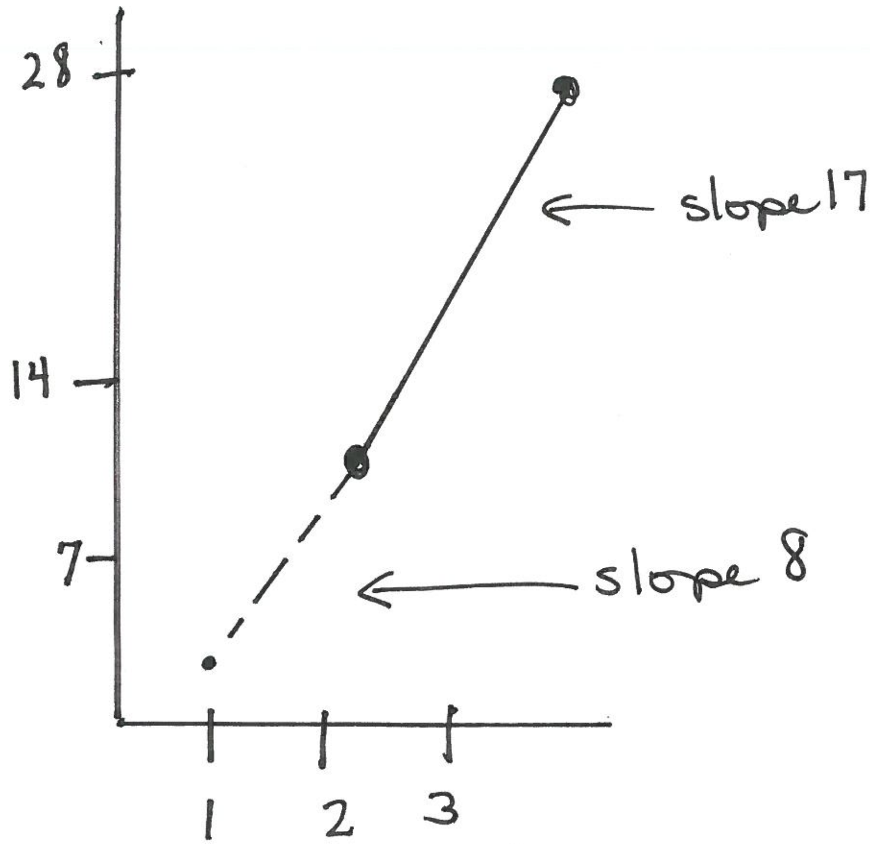
$$\hat{m} = \frac{S_{xy}}{S_{xx}}$$

$$\hat{b} = \bar{y} - \hat{m}\bar{x}$$

$$\rho = \frac{S_{xy}}{\sqrt{S_{xx} S_{yy}}}$$

$$R^2 = \rho^2$$

Chapter 4 2nd Part
~~4-9~~
4-14



4-14'

$\bar{x} = 2, \bar{y} = 14$

$S_{xy} = 25$ $S_{yy} = 326$

$S_{xx} = 2$

$\hat{m} = \frac{S_{xy}}{S_{xx}} = \frac{25}{2}$

$\bar{y} = \hat{m}\bar{x} + \hat{b}$

$14 = \frac{25}{2}(2) + \hat{b}$

$-11 = \hat{b}$

$\rho = \frac{S_{xy}}{\sqrt{S_{xx} S_{yy}}} = .979$

$y = \frac{25}{2}x - 11$

Semi-log

x	1	2	3
$\ln y$	$\ln 3$	$\ln 11$	$\ln 28$
$\ln y$	1.099	2.397	3.332

~~log~~ $\ln y = 1.117x + .043$

used polyfit $(x, \cancel{\log}(y), 1)$

$\rho_{\text{semi log}} = .9956$

$$y = e^{1.117x + .043}$$

4-16

$$\ln y = 1.117x + .043$$

$$e^{\ln y} = e^{1.117x + .043}$$

$$y = e^{1.117x} e^{.043}$$

$$y = 1.044 e^{1.117x}$$

exp.
fcn.

$$e^{11+4} = e^{11} e^{4}$$

4-16-12

$\bar{x} = 2$

$\ln y$ 1.099 2.397 3.332

mean of $\ln y$ $= 2.276$

$$S_{xy} = (1-2)(1.099-2.276) + (2-2)(2.397-2.276) + (3-2)(3.332-2.276)$$

to fit line on $(x, \ln y)$ data

4-16