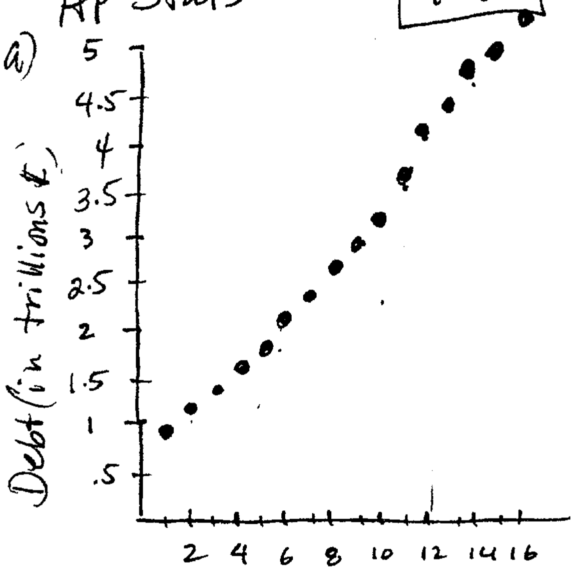
AP Stats $\boxed{4.2}$

a)

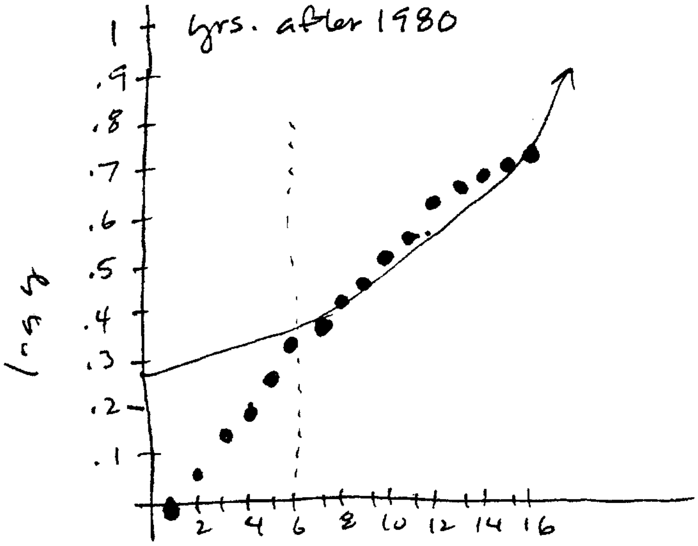


b) y_n / y_{n-1}

1.144
1.206
1.142
1.160
1.166
1.106
1.107
1.098
1.132
1.134
1.109
1.085
1.063
1.060
1.050
$\bar{x} = 1.12$

c) log y

-8.6946×10^{-4}
.05767
.13893
.19645
.26079
⋮



c) d)

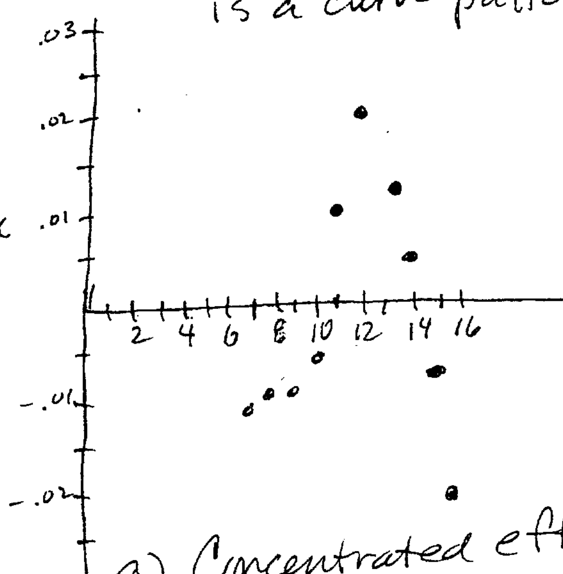
$\log \hat{y} = .1041 + .0401x$

e) $r = .9905$ $r^2 = .9812$

$\boxed{10^{(.1041 + .0401x)} = \hat{y}}$

There is a strong linear association ($r = .9905$)

f) Residual plot for $(x, \log y)$ shows some problems. There is a curve pattern.



g) Concentrated efforts to reduce the deficit and a good economy slowed the growth of the dept.

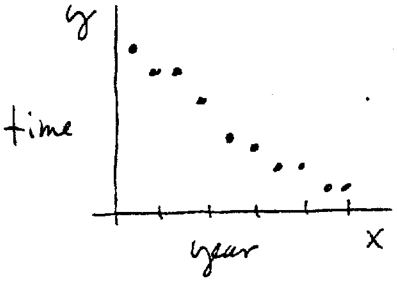
1997 $\hat{y} \doteq 6.11338$ trillion

$ 6,113,381,179,700

i) The debt growth seems to slow near the year 1996. The model will not predict the year 2000 debt very well.

AP Stats $\boxed{4.14}$

linear regression $\hat{y} = 381.66 + (-.1408)x$ $r = -.983$, $r^2 = .966$



Men's times

$(x, \log y)$ $\log\hat{y} = 3.141 - .00057x$ $r = -.984$ $r^2 = .968$

→ $(\log x, \log y)$ $\log \hat{y} = 10.451 - 2.5598 \log x$ $r = -.984$ $r^2 = .9689$

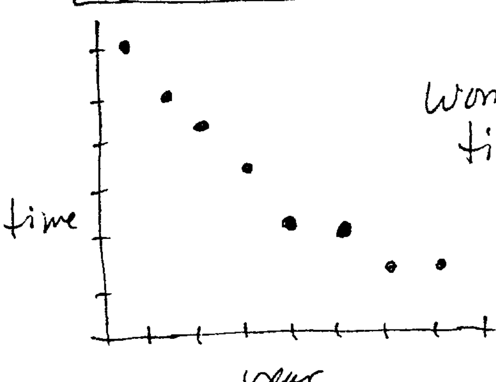
Power model is the best fit, but not by much.

$\hat{y} = 10^{(10.451 - 2.5598 \log x)}$

$\hat{y} = 10^{10.451} \cdot 10^{(\log x)(-2.5598)}$

men $\boxed{\hat{y} = 10^{10.451} \cdot x^{-2.5598}}$

$\hat{y} = 1004.8 - .449x$ $r = -.969$, $r^2 = .9385$



Women's times

$\log \hat{y} = 5.120 - .0015x$ $r = -.974$, $r^2 = .9481$

$\log \hat{y} = 25.051 - 6.973 \log x$ $r = -.975$, $r^2 = .9500$

The power model is better.

$\hat{y} = 10^{(25.051 - 6.973 \log x)}$

$\hat{y} = (10^{25.051})(10^{\log x})^{-6.973}$

women $\boxed{\hat{y} = (10^{25.051})(x)^{-6.973}}$

The curves cannot = zero

The curves will intersect at about 2033 (time 96 sec.)

Extrapolation is dangerous!

Both power models appear to be fairly good models.

APStats 14.6, 8, 9

$\boxed{14.6}$ a) $\hat{y} = -3.6596 + 1.1969x$

$\left(\begin{smallmatrix}\text{length}\\ \text{humerus}\end{smallmatrix}\right) = -3.6596 + 1.1969\left(\begin{smallmatrix}\text{length}\\ \text{femur}\end{smallmatrix}\right)$

b) $t = \frac{b}{SE_b}$ $\quad t = \frac{1.1969}{0.0751} = 15.94$

c) $df = 5-2 = 3$

$p \approx .0005$

d) $\hat{y} = -3.659586682 + 1.196900115x$

$t = 15.94050984 \quad p = 5.3684038 \times 10^{-4}$

$\boxed{14.8}$ a) $r^2 = 99.8\%$ This is very close to 100% which means that nearly all of the variation in steps per second is accounted for by foot speed. Also, the p-value is very small so we would reject $\beta = 0$ and conclude that there is a relationship between the two variables.

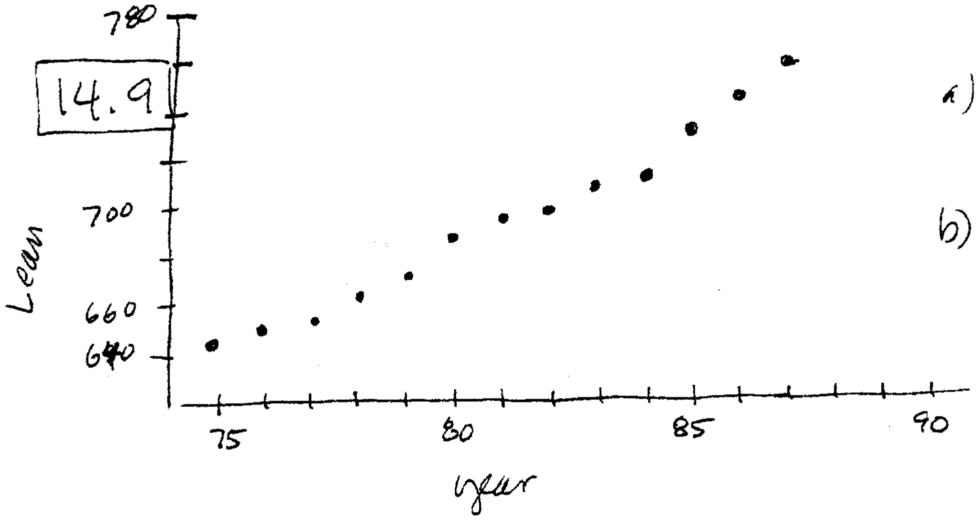
$p < .0001$

b) β, the slope, is this rate. $b = .080284$

99% C.I. for b $\quad .080284 \pm 4.032(.0016)$

$\rightarrow (.0738328, .0867352)$

We are 99% confident that the true rate at which steps per second increases as running speed increases is between .074 and .087.



a) strong, positive, linear association

b) $\frac{\text{lean}}{\text{year}} = \beta$ (slope)

$\boxed{9.31868}$ tenths of a mm per year

c) 95% C.I. $df = 13 - 2 = 11$ $t^* = 2.201$

$9.31868 \pm 2.201(0.3099)$

$9.31868 \pm .6820899$

$(8.6365901, 10.0007699)$

We can be 95% confident that the tower is tilting at a rate between 8.6 and 10 tenths of a mm per year.