

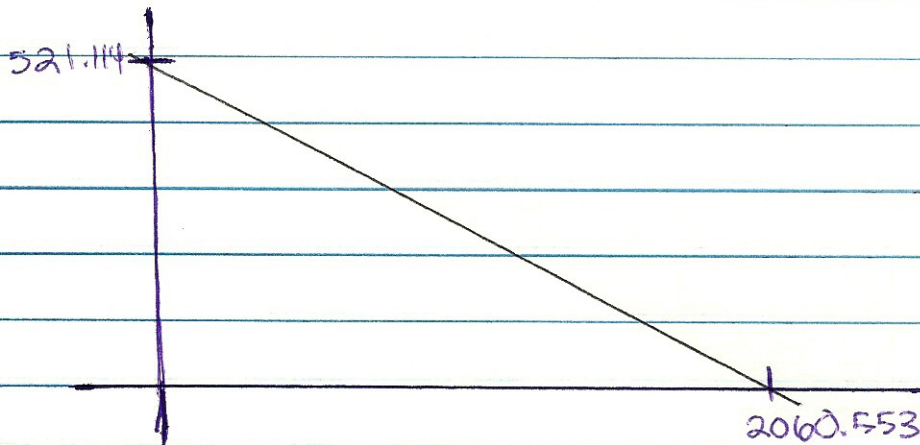




# Linear Least Squares Lab Cont.

Part II cont.

(e) <sup>Graph</sup>  $y = -0.2529x + 521.114$



(f) estimate for year 2010. Deaths per 100,000.

$$2010(-0.2529) + 521.114 = 12.785$$

Part III system.  $y = ax^2 + bx + c$

(a)	400	20	1		47
	900	30	1	A	83
	1600	40	1	B	145
	2500	50	1	C	243
	3600	60	1		366
	4900	70	1		529

(b)  $A^{-1}$

400	900	1600	2500	3600	4900
20	30	40	50	60	70
1	1	1	1	1	1



Part III Cont.

(C)  $A^T Ax = A^T b$

$$\begin{bmatrix} 46750000 & 783000 & 13900 \\ 783000 & 13900 & 270 \\ 13900 & 270 & 6 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 482700 \\ 80370 \\ 1413 \end{bmatrix}$$

(D) Solution

$$46750000A + 783000B + 13900C = 482700$$

$$783000A + 13900B + 270C = 80370$$

$$13900A + 270C + 6c = 1413$$

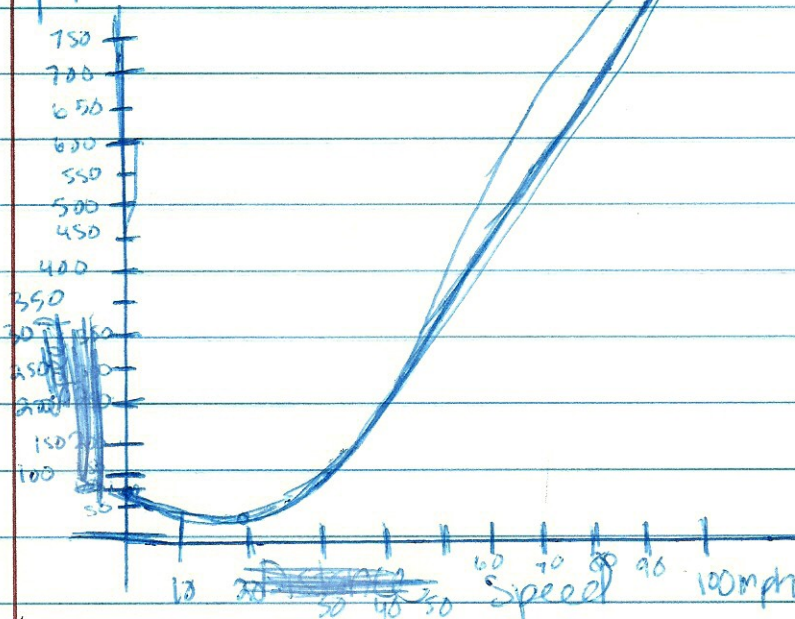
$$A = .157$$

$$B = -4.5$$

$$C = 75.96$$

$$y = .157x^2 - 4.5x + 75.96$$

(e) graph





Part III cont.

f

How fast if skid marks 722 ft?

$$722 = 0.157x^2 - 4.5x + 75.96$$

$$x = 80$$

80 mph is the speed

Part IV

a

using  $y = mx + b$

b

system  $Ax = b$

10	1	[M] [B]	=	4.56
20	1		6.57	
30	1		8.14	
40	1		9.48	
50	1		10.65	
60	1		11.85	
70	1		12.46	

c

$A^T$

10	20	30	40	50	60	70
1	1	1	1	1	1	1



Lab cont.

Part IV cont.

(d)  $A^T A x = A^T b$

$$\begin{bmatrix} 14000 & 280 \\ 280 & 7 \end{bmatrix} \begin{bmatrix} m \\ b \end{bmatrix} = \begin{bmatrix} 2916.10 \\ 63.71 \end{bmatrix}$$

(e) solution

$$14000m + 280b = 2916.10$$

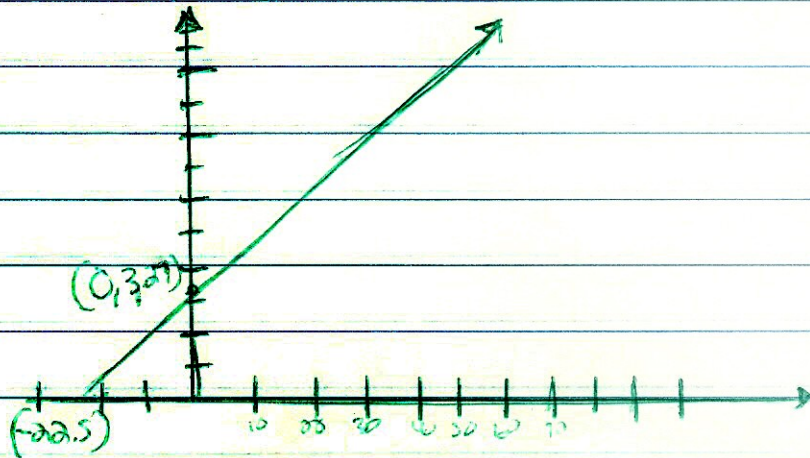
$$280m + 7b = 63.71$$

$$m = .1456$$

$$b = 3.277$$

$$y = .1456x + 3.277$$

(f) graph



(g) how long to travel 150 feet

$$y = .1456(150) + 3.277$$

$$25.117$$

25 seconds

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