

M146 Sample Quiz #06 for Thursday, May 4, 2006

(1) Let $C = \begin{bmatrix} 1 \\ 2 \\ 5 \end{bmatrix}$. Find the point on the line $x = Ct$ closest to the point $b = \begin{bmatrix} 3 \\ 4 \\ 7 \end{bmatrix}$.

(2) $A = \begin{bmatrix} 1 & 3 \\ 2 & 2 \\ 5 & 1 \end{bmatrix}$; $b = \begin{bmatrix} 3 \\ 4 \\ 7 \end{bmatrix}$. Find the best (least squares) solution to $Ax = b$

(3) The following data were obtained for the length y in centimeters of a human fetus versus the age t in weeks. Find a linear function $y = b + mt$ which best fits the data.

Age t	12	20	28	40
Length y	10	25	38	53

(4) Radioactive sample Y is decaying exponentially. The data shows the amount (y in grams) of Y at times (t in days). Find an exponential function $y = Ae^{rt}$ which best fits the data.

t	0	1	2	3	4	5
y	100	82	67	55	45	37

(5) The table shows the length-weight relation for Pacific halibut. Find an power function $W = \alpha L^\beta$ which best fits the data.

L	0.5	1.0	1.5	2.0	2.5
W	1.3	10.4	35	82	163

(6) The velocity of an enzymatic reaction with Michaelis-Menton kinetics is given by

$$v(s) = \frac{\alpha s}{1 + \beta s}$$

Find the Michaelis-Menton equation which best fits the data:

s	1	2.5	5	10	20
v	4.1	6.1	9.3	12.9	17.1