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Subject: Probability and Statistics Subject Code: 310006

Tutorial 1: Curve Fitting Note: Example numbers 1, 2, 3, 5, 7, 9, 11, 12, 13 will be solved in the tutorial. The remaining examples are for self-practice.

Q.1 What is least square method? Derive normal equations for fitting straight line?

Q.2 Write Normal Equations for fitting second degree parabola and exponential curve of the form $y = ax^b$.

Q.3 In $y = a + bx$, if $\sum x = 50$, $\sum y = 80$, $\sum xy = 1030$, $\sum x^2 = 750$ and $n = 10$, then find a and b

Q.4 A simply supported beam carries a concentrated load P(lb) at its midpoint. Corresponding to various values of P the maximum deflection y (in) is measured. The corresponding table is given below. Find the low of the $y = a + bP$.

P:	100	120	140	160	180	200
y:	0.45	0.55	0.60	0.70	0.80	0.85

Q.5 Fit a straight line using least square method for the following data. Also, estimate the value of y at x=72.

x:	65	66	67	67	68	69	71	73
y:	67	68	64	68	72	70	69	70

Q.6 The following show the gain in reading speed of 3 students in a speed-reading program, and the number of weeks they have been in the program: Fit a straight line by the method of least squares.

No. of weeks	3	5	2	8	6	9	3	4
Speed gain	86	118	49	193	164	232	73	109

Q.7 Fit a parabola $y = ax^2 + bx + c$ for the following data:

x:	-1	0	1	2
y:	-2	1	2	4

Q.8 Fit a parabola $y = a + bx + cx^2$ to the following data:

x:	0	1	2	3	4
y:	1	4	10	17	30

Q.9 Fit the second-degree parabola using the least square method to the following data: Also, estimate y at x=6.

x:	1	2	3	4	5
y:	5	12	26	60	97

Q.10 Fit a parabola $y = a + bx + cx^2$ to the following data:

x:	1	2	3	5	6
y:	1.1	5.8	17.5	55.9	86.7

Q.11 The following are the data on the drying time of a certain varnish and the amount of an additive that is intended to reduce the drying time. (i) Fit a second-degree polynomial by the method of least square. (ii) Use the result of (i) to predict the drying time of the varnish when 6.5 gms of the additive is being used.

Amount of varnish additive(grams) x:	0	1	2	3	4	5	6	7	8
Drying time(hr) y:	12.0	10.5	10.0	8.0	7.0	8.0	7.5	8.5	9.0

Q.12 Fit a curve $y = ae^{bx}$ for the following data:

x:	1	2	3	4
y:	7	11	17	27

Q.13 By the method of least square fit a curve of the form $y = ax^b$ to the following data.

x:	2	3	4	5
y:	27.8	62.1	110	161