Trend Analysis with Unequally Spaced Independent Variables (Example in Handout #16 -- 3-way factorial)

Independent Variables: (6, 12, 24, 72)/6 = 1, 2, 4, 12. Remember that X takes the value of the IV.

Linear = $C_j = a_1 + x_i$

$C_1 = a_1 + 1$ $\quad C_1 = -4.75 + 1 = -3.75$

$C_2 = a_1 + 2$ $\quad C_2 = -4.75 + 2 = -2.75$

$C_3 = a_1 + 4$ $\quad C_3 = -4.75 + 4 = -.75$

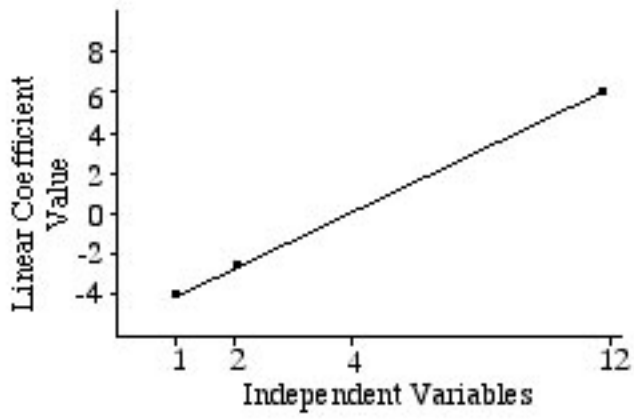
$C_4 = a_1 + 12$ $\quad C_4 = -4.75 + 12 = -7.25$

$\Sigma C_j = 4a_1 + 19$

$0 = 4a_1 + 19$

$-19 = 4a_1$

$\boxed{-4.75 = a}$



Quadratic = $C_j = a_2 + b_2\chi_j + \chi_j^2$

$C_1 = a_2 + b_2(1) + 1^2$

$C_2 = a_2 + b_2(2) + 2^2$

$C_3 = a_2 + b_2(4) + 4^2$

$C_4 = a_2 + b_2(12) + 12^2$

$\Sigma C_j = 4a_2 + 19b_2 + 165$

Solve for b_2

$(-3.75)(a_2 + b_2 + 1)$

$(-2.75)(a_2 + 2b_2 + 4)$

$(-.75)(a_2 + 4b_2 + 16)$

$(7.25)(a_2 + 12b_2 + 144)$

$-3.75a_2 - 3.75b_2 - 3.75$

$-2.75a_2 - 5.5b_2 - 11$

$-.75a_2 - 3b_2 - 12$

$7.25a_2 + 87b_2 + 1044$

$0a_2 + 74.75b_2 + 1017.25$

(continued next page)

Solve for a_2 using b_2

$0 = 4a_2 + 19(-13.61) + 165$

$0 = 4a_2 - 93.59$

$93.59 = 4a_2$

(b_2)

$\boxed{23.4 = a_2}$

$0 = 74.75b_2 + 1017.25$

$-1017.25 = 74.75b_2$

$\boxed{-13.61 = b_2}$

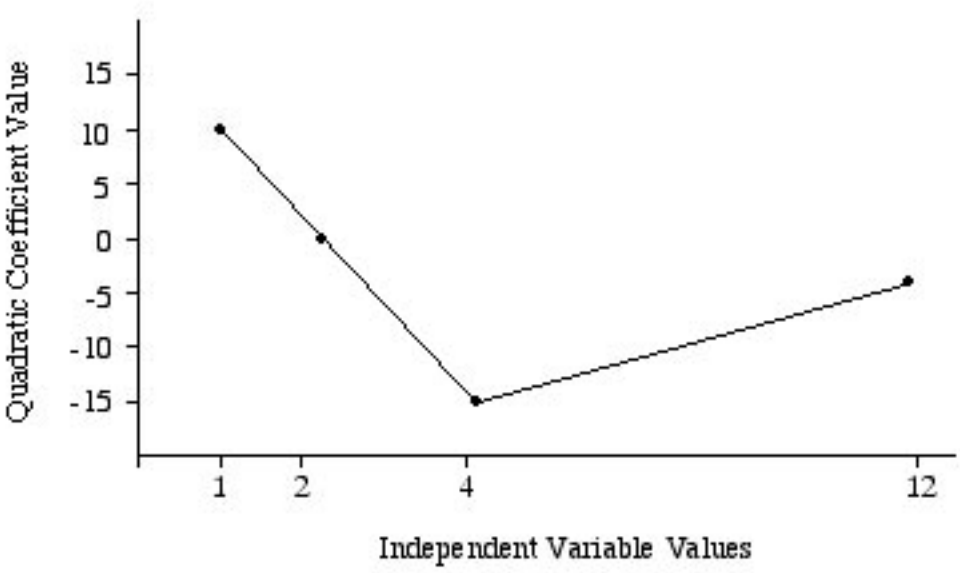
Find coefficients using a_2 and b_2

$C_1 = 23.4 + (-13.61)(1) + 1 = 10.79$

$C_2 = 23.4 + (-13.61)(2) + 4 = .18$

$C_3 = 23.4 + (-13.61)(4) + 16 = -15.04$

$C_4 = 23.4 + (-13.61)(12) + 144 = 4.08$



Note: This handout was originally prepared by TA Kim Dadisman. Thanks, Kim.