

AnSc 5403
Biometry

Formula Sheet for Exam 4

A. Example short-cut calculations for simple linear regression

	Age class midpoint, x		Mean blood pressure, y	
	35		114	
	45		124	
	55		143	
	65		158	
	75		166	
ΣX	275	ΣY	705	
\bar{x}	55	\bar{y}	141	
ΣX^2	16,125	ΣY^2	101,341	$\Sigma XY = 40,155$
$(\Sigma X)^2/n$	15,125	$(\Sigma Y)^2/n$	99,405	$(\Sigma X)(\Sigma Y)/n = 38,755$
Σx^2	1,000	Σy^2	1,936	$\Sigma xy = 1,380$

1. From these basic calculations, we can derive all the components of the regression equation:

- a. $b_1 = \Sigma xy / \Sigma x^2 = 1,380 / 1,000 = 1.38$
- b. $\hat{y} = \bar{y} + b_1(x - \bar{x}) = 141 + 1.38(x - 55) = 65.1 + 1.38x$
- c. $\Sigma d_{y,x}^2 = \Sigma y^2 - (\Sigma xy)^2 / \Sigma x^2 = 1,936 - (1,380)^2 / 1,000 = 31.60$
- d. $s_{y,x}^2 = \Sigma d_{y,x}^2 / (n-2) = 31.60 / 3 = 10.53$
- e. $s_{y,x} = \sqrt{10.53} = 3.245$
- f. $s_b = s_{y,x} / \sqrt{\Sigma x^2} = 3.245 / \sqrt{1,000} = 0.102$

B. The test statistic for the χ^2 test for difference in probabilities is given by:

- a. $\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$, where $E_{ij} = \frac{n_i C_j}{N}$, where n_i is the row total for a given population, C_j is the column total for a given class, and $N =$ the grand total.

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C. The test statistic for the χ^2 test for independence is given by:

a. $\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$, where $E_{ij} = \frac{R_i C_j}{N}$, with R_i and C_j being the row and column totals and N being the grand total.