Examen Aut. 04 Final

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Manuscrit

1) a) i) $\hat{\mu}_{Y_q} = \mu_X \hat{R} = 0.9375$

$= \mu_X \left(\frac{\bar{y}}{\bar{x}}\right)$

$= \frac{(2)(1.5)}{(3.2)}$

$= 0.9375$

y : enfants #
x : nb. de personnes ménage

N : 1200 ménages

$\sum_{i=1}^{N} x_i = 2400$

$\mu_X = \frac{\sum x_i}{N} = \frac{2400}{1200} = 2$

n = 20 ménages

ii)

$\hat{R} = \frac{\bar{y}}{\bar{x}} = \frac{1.5}{3.2} = 0.46875$

$\hat{R} = \frac{\sum y_i}{\sum x_i}$

iii) $\hat{p} = \frac{x}{n} = \frac{5}{20} = 0.25$

iv) $T_M = N\bar{y} = (1200)(1.5) = 1800$

v) $T_d = N[\hat{\mu}_{Y_d}] = N[(\bar{y} - \bar{x}) + \mu_X]$

$= 1200[(1.5 - 3.2) + 2]$

$= 360$

vi) $T_q = N[\hat{\mu}_{Y_q}] = (1200)(0.9375)$

$= 1125$

vii) Nb. de zero est $\boxed{5}$, nb. de x_i contenant 0 enfant $\boxed{2}$

Nb. de personnes correspondant : 10

Moyenne $\frac{5}{10} = \frac{1}{2}$ (il y a $(\frac{1}{2})$ personne par ménage contenant 0 enfant)

$T = 1200(\frac{1}{2}) = 600$

viii) $\sum_{i=1}^{20} x_i = 64$ [x_i nb. de personnes; x_i^* ——— ds ménage contenant 0 enfant

$\sum_{i=1}^{5} x_i^* = 10$ (pas d'enfants)

$\frac{10}{64} = 0.15625$

$T = (0.15625)(2400)$
$= 375$

b)

i) on a $\widehat{Var}(\hat{R}) = \frac{(1-f)}{n} \frac{(s_y^2 + \hat{R}^2 s_x^2 - 2\hat{R} s_{xy})}{\bar{x}^2}$

$$= \frac{\left(1 - \frac{20}{1200}\right)}{20} \frac{\left(1.63158 + (0.46875)^2(2.16842) - 2(0.46875)(1.63158)\right)}{(3.2)^2}$$

$$= \frac{0.0491666\,(0.578433222)}{10.24}$$

$$= 0.002777304$$

b) ii) $T = N_{mé.} * \frac{1}{2}$

$= 1200\left(\frac{1}{2}\right)$

$= 600$ (il y a $\frac{1}{2}$ personne par ménage contenant 0 enfant)

$= (1200)\left(\frac{5}{10}\right)$

Vu on calcule la variance de
4, 1, 1, 2, 2 et 0 — pr. les 15 autres

$s^2 = (1.05134966)^2$

$s^2 = 1.105263158$

$Var(T) = (1200)^2\left(1 - \frac{20}{1200}\right)\left(\frac{1}{20}\right) 1.105263158$

$= (1440000)(0.98333)(0.075)$

$= 78252.62893$

$\simeq 78253$

$Var(T) = Var(N\bar{y}) = N^2 \frac{s_y^2}{n}\left(1 - \frac{n}{N}\right)$

4) Aut. 2004, Blan. (4)

a) $\bar{y}_{st} = \sum_{h=1}^{3} W_h \bar{y}_h$

$W_1 = \frac{1000}{4000} = \frac{1}{4} = 0.25$

$W_2 = \frac{1600}{4000} = 0.4$

$\sum_{h=1}^{3} W_h = 1$

$W_3 = \frac{1400}{4000} = 0.35$

$\bar{y}_{st} = (0.25)(38) + (0.4)(65) + (0.35)(78)$

$= 9.5 + 26 + 27.3$

$\bar{y}_{st} = 62.8$

b) $\hat{\sigma}_{\bar{y}_{st}} = \sqrt{\sum W_h^2 \frac{s_h^2}{n_h}\left(1 - \frac{n_h}{N_h}\right)}$

$= \sqrt{(0.25)^2 \frac{(14)^2}{16}\left(1 - \frac{16}{1000}\right) + (0.4)^2 \frac{(13)^2}{20}\left(1 - \frac{20}{1600}\right) + (0.35)^2 \frac{(11)^2}{14}\left(1 - \frac{14}{1400}\right)}$

$= 1.771055$

c) $n_h = \left(\dfrac{N_h \hat{S}_h}{\sum_{i}^{3} N_i \hat{S}_i} \right) n$

$N_1 \hat{S}_1 = (1000)(14) = 14000$

$N_2 \hat{S}_2 = (1600)(13) = 20800$

$N_2 \hat{S}_3 = (1400)(11) = 15400$

$\sum N_i \hat{S}_i = \cancel{14000}\ 50200$

$n_1 = \left(\dfrac{14000}{50200} \right)(300)$

$n_1 = 83.6653$

$n_1 \simeq 84$

$n_2 = \left(\dfrac{20800}{50200} \right)(300)$

$= 124.30$

$n_2 \simeq 124$

$n_3 = \left(\dfrac{15400}{50200} \right)(300)$

$n_3 \simeq 92.03$

$n_3 = 92$

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