Kortlösning till tentamen i 732G26, Surveymet. m uppsats. 20120613

1 a) $\bar{y}_u = 2.86$ $S = 1.069$ $S^2 = 1.143$

c) $\binom{7}{2}$

d)

$\bar{y} = k$	1.5	2	2.5	3	3.5	4
$P(\bar{y} = k)$	1/21	3/21	5/21	5/21	6/21	1/21

e) $E[\bar{y}] = \sum_k P(\bar{y} = k) \cdot k = \ldots = 2.86$

$E[S^2] = \sum_k P(S^2 = k) \cdot k = \ldots = 1.14$

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2) $N = 2000$ $n = 200$ $n_d = 60$

a) p = andelen träd med djurskador bland de med barkskydd

$$\hat{p}_d \pm 1.96 \sqrt{\frac{\hat{p}_d(1-\hat{p}_d)}{n_d - 1}\left(1 - \frac{n}{N}\right)} \qquad \hat{p}_d = \frac{12}{60}$$

$$0.2 \pm 1.96 \sqrt{\frac{0.2 \cdot 0.8}{59}\left(1 - \frac{200}{2000}\right)} = 0.0968$$

(0.1 _ 0.3) 95%

b) $\hat{t}_{yd} = N\bar{u} = 2000 \cdot \frac{12}{200} = 120$

$$\frac{S_u^2}{n} = \frac{\frac{12}{200}\left(1 - \frac{12}{200}\right)}{199} \qquad 120 \pm \underbrace{1.96 \cdot 2000 \cdot 0.0168}_{66}$$

(54, 186 träd) 95%

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3) $n = 150$ 13 uppvisar skada

$n_R = 142$ $n_M = 8$. 3 av de 8 väljs ut varav 1 har skada

$$\hat{p} = \frac{142}{150} \cdot \frac{13}{142} + \frac{8}{150} \cdot \frac{1}{3} = 0.1044 \approx 0.10$$

$$\hat{V}(\hat{p}) = \frac{141}{149} \cdot \frac{\frac{13}{142}\left(1 - \frac{13}{142}\right)}{149} + \frac{7}{149} \frac{\left(\frac{1}{3} \cdot \frac{2}{3}\right)}{\frac{3}{8} \cdot 150} +$$

$$+ \frac{1}{149}\left(\frac{142}{150}\left(\frac{13}{142} - 0.1044\right)^2 + \frac{8}{150}\left(\frac{1}{3} - 0.1044\right)^2\right) =$$

$$= 0.0005 + 0.0002 + \frac{1}{149}(0.0002 + 0.0028) = 0.0007$$

3 forts

$\hat{p} \pm 1.96\sqrt{\hat{V}(\hat{p})} \Rightarrow 0.10 \pm 0.053$

4a) $\bar{y}_{str} = 0.4355 \cdot 92.500 + 0.5645 \cdot 112500$

$= 103793$ kr

$\hat{V}(\bar{y}_{str}) = 0.9692 \cdot 0.4355^2 \cdot \frac{12680}{2000} +$

$09763 \cdot 0.5645^2 \cdot \frac{32000}{2000} = 6.1431$

103793 ± 4.8 (95%)

b) Lika allokering

$n_1 = 4000 \cdot \frac{64992 \cdot \sqrt{12680}}{64992\sqrt{12680} + 84251\sqrt{32000}}$

$= 1307 \Rightarrow n_2 = 2693$

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5) $N = 80$ $n = 5$ Kvotskattning av $\bar{y}_U$

$\hat{\bar{y}}_r = \frac{\sum t_i}{\sum M_i} = \frac{39840}{41} = 971.7$ min

$SE(\hat{\bar{y}}_r) = \sqrt{(1 - \frac{5}{80})\frac{1}{5 \cdot 8.2^2 \cdot 4}\left[\sum t_i^2 + \hat{\bar{y}}_r^2 \sum M_i^2 - 2\hat{\bar{y}}_r \sum t_i \cdot M_i\right]}$

$\sum t_i^2 = 396518400$ $\sum M_i^2 = 387$ $\sum M_i t_i = 375840$

$SE(\hat{\bar{y}}_r) = 148.23$

95% KI för $\bar{y}_U$ 971.7 ± 290.5 min