usually −2 for plug in online −3 wrong formula

Math 485 Exam 1 Fall 2003 Name___________

YOU ARE BEING GRADED FOR WORK, NOT JUST THE FINAL ANSWER. Three sheet of notes.

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1) As part of a statistics project in 1979, Mr. Alpert approached the first 100 students that he saw one day at Sproul plaza at Berkeley, and found out the major of each student. His sample included 53 men and 47 women. From the registrar's data, 67% of the students at Berkeley were men. What type of sample was used to gather this data?

sample of convenience

people easy to reach, not a response to a general appeal

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2) To estimate the size of a pheasant population, traps are used to catch 750 pheasants. Each of these pheasants is tagged and released. Several weeks later, a second sample of 750 pheasants are caught. Assume that 168 of these had tags.

a) Find $\hat{N}$. $= \frac{nt}{x} = \frac{750\,(750)}{168} = \boxed{3348.2143}$

b) Find $SE(\hat{N})$. $= \sqrt{\frac{t^2\, n\,(n-x)}{x^3}} = \sqrt{\frac{(750)^2\,(750)(750-168)}{(168)^3}}$

$= \sqrt{51782.013} = \boxed{227.5566}$

indirect −2

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3) Suppose that the population has two strata, women and men:

1 Min, 2 Kim, 3 Jennifer, 4 Makane, 5 Vola, 6 Michiyo

1 John, 2 Tim, 3 Abdellatif, 4 Abuhassan, 5 Rajan, 6 Richard, 7 Robert, 8 Jeff, and 9 Josh.

a) Use line 101 of table B to draw a SRS of 3 women.

101: 1 9 2 2 3

Min, Kim, Jennifer

or Kim Jennifer Min

b) Use line 106 of table B to draw a SRS of 3 men.

106: 6 8 4

Richard, Jeff, Abuhassan

or Abuhassan Jeff Richard

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4) Suppose that a cluster sample was used to estimate size of the March 1994 civilian labor force. The results from the survey were split into two independent halves. One half of the survey estimates the civilian labor force to be 128.71 (million people) while the other half estimates the civilian labor force to be 130.44. What is the estimated SE for the size of the civilian labor force (in millions)?

$$\frac{130.44-128.71}{2} = \frac{1.73}{2} = \boxed{0.865}$$

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5) The current population survey is used to estimate unemployment in the United States every month. Why does the survey include approximately 1000 households from every state?

So that the unemployment estimates in each state have about the same accuracy

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6) Suppose that a maple syrup producer collects syrup from 1484 trees. To estimate the average sugar content μ, a SRS of 212 trees is taken. Assume that $\sum_{i=1}^{n} y_i = 17,066.00$ and $S^2 = 535.483$.

a) Find $\hat{\mu}$. $= \bar{y} = \frac{17066}{212} = \boxed{80.5}$

b) Find $SE(\hat{\mu})$. $= \sqrt{\frac{S^2}{n}\,\frac{N-n}{N}} = \sqrt{\frac{535.483}{212}\,\frac{1484-212}{1484}}$

$= \sqrt{2.1650} = \boxed{1.4714}$

c) Suppose that in the above story problem "a SRS of 212 trees" was changed to "a systematic sample of 212 trees" (1 in 7 sampling). Would $\hat{\mu}$ and $SE(\hat{\mu})$ change?

$\boxed{\text{no, same formulas apply}}$ or -4

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7) Suppose that a university has 600 assistant professors and that a previous study suggested that 4% of the assistant professors have high blood pressure. Let p be the proportion of the 600 assistant professors who have high blood pressure. Find the SRS size n needed to estimate p to within a margin of error of 0.05 with 95% confidence.

$p^* = .04$ $\quad n = \frac{N p^*(1-p^*)}{(N-1)\left(\frac{B}{1.96}\right)^2 + p^*(1-p^*)}$ $\quad p^* = .5$ -3

$= \frac{600(.04)(.96)}{599\left(\frac{.05}{1.96}\right)^2 + .04(.96)} = \frac{23.04}{.4282} = 53.805$ -1

$\frac{600 \cdot .5 \cdot .5}{599 \cdot (.05 ...)^2 + ...}$ $=$ $\frac{150}{.6398}$ $= 235$

$\boxed{54}$

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8) Suppose that y_i = sugar content and x_i = weight of oranges from a truck load of 4000 oranges. A simple random sample of $n = 10$ oranges was juiced and weighed. $\sum y_i = 0.246$, $\sum x_i = 4.35$ and $\sum(y_i - rx_i)^2 = 0.0000522\cancel{85}$ 3. Notice that μ_x is unknown.

a) $\hat{R}$ $= \frac{\sum y_i}{\sum x_i} = \frac{0.246}{4.35} = \boxed{0.05655}$

b) $SE(\hat{R})$ $= \sqrt{\frac{N-n}{nN} \frac{1}{(\bar{x})^2} \frac{\sum(y_i - rx_i)^2}{n-1}} = \sqrt{\frac{4000-10}{10(4000)} \frac{1}{\left(\frac{4.35}{10}\right)^2} \frac{.0000523}{9}}$

$= \sqrt{.0000031} = \boxed{.0017502}$

c) $\hat{\mu}_y$ $= r\bar{x} = \frac{\bar{y}}{\bar{x}}\bar{x} = \bar{y} = \frac{0.246}{10} = \boxed{.0246}$

d) $SE(\hat{\mu}_y)$ $= \sqrt{\frac{N-n}{nN} \frac{\sum(y_i - rx_i)^2}{n-1}}$

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$= \sqrt{\frac{4000-10}{10\ (4000)} \frac{.0000523}{9}}$

$= \sqrt{.0000006} = \boxed{.0007614}$

$= 7.614 \times 10^{-4}$

	under 2.5	2.5–4	over 4
N_i	2000	6000	2000
n_i	100	500	400
$\hat{p}_i$	0.2500	0.0140	0.0075
$SE(\hat{p}_i)$	0.04242	0.00504	0.00386

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9) The above table gives data for a stratified random sample from the 1999 Chicago Marathon. The strata are the number of hours to complete the marathon.

a) Verify that $SE(\hat{p}_1) \approx 0.04242$ for the "under 2.5" stratum. (Use the SRS formula.)

$$\sqrt{\frac{\hat{p}(1-\hat{p})}{n-1}\left(\frac{N-n}{N}\right)} = \sqrt{\frac{.25\,(.75)}{99}\;\frac{2000-100}{2000}}$$

$$= \sqrt{.0017992} = \boxed{.04242}$$

b) Compute $\hat{p}_{st}$. $= \frac{1}{N} \sum N_i \hat{p}_i = \frac{1}{10000}\left[2000(.25) + 6000(.014) + 2000(.0075)\right]$

F10 makeup exam

$$= \frac{599}{10000} = \boxed{0.0599}$$

c) Compute $SE(\hat{p}_{st})$.

$$= \sqrt{\sum_{i=1}^{3}\left[\frac{N_i}{N}\,SE(\hat{p}_i)\right]^2} =$$

$$\sqrt{\left(\frac{2000}{10000}\;.04242\right)^2 + \left(\frac{6000}{10000}\;.00504\right)^2 + \left(\frac{2000}{10000}\cdot 0.0386\right)^2}$$

$$= \sqrt{.00000817} = \boxed{0.009040}$$