

hwk 1 due <sup>next</sup> Tue not Mon } disc. rec. ↑ } ANS? 23 Jun 2016

~~HW~~ litter size in dogs: ①

# pups ← variable

ex. 3
2
7
4
0
⋮

1 row for each subject

litter

h = ?

hint? yes

- ✓ quant. bec...
- ✓ disc. bec...
- ✓ ratio bec...

disc. (no)

3 (a)

3	0
2	0
7	1
4	0
0	⋮
⋮	1

26 pups?

no  
no  
yes  
no  
no  
↑  
quant

hint? yes

- quant.
- disc.
- ratio.

disc? yes

3(b)

location  
↓ phosphate conc.

mass. weekly	14.2	ex.
Johnny	3.8	
Jane	210.4	

1 row for each stream

n = 60

subjects

quant.  
(conc.) cont.  
ratio

hold

time:  
one day of week,  
one time of day

constant

hist.?  
yes

3(c)

temp (°C)
21.4
20.7
22.8
⋮
1

1 row for each night

n = 44

subject

quant.  
cont.  
interval

hold

location

constant

hist.?  
yes

3(d)

type
turtle
snake
turtle
i

n = ?

qual.  
nominal  
not dich.

1 row  
for each  
vert.  
animal  
subjects

hist. ? no  
bar chart ? yes

$$2 (a) (i) \sum_{i=1}^3 1 = 1 + 1 + 1 = 3 \quad (4)$$

$$(ii) \sum_{i=1}^n 1 = \underbrace{1 + 1 + \dots + 1}_n = n$$

$n \geq 1$   
↑  
integer

$$(iii) \sum_{i=1}^5 i = 1 + 2 + \dots + 5$$

$$1 + 2 + 3 + 4 + 5 = 15$$

$$(iv) \left( \sum_{i=1}^n \gamma_i \right) - \left( \sum_{j=1}^n \gamma_j \right) =$$

$$\left( \gamma_1 + \gamma_2 + \dots + \gamma_n \right) - \left( \gamma_1 + \gamma_2 + \dots + \gamma_n \right) = 0$$

$$(v) \sum_{i=1}^n (\gamma_i + c) =$$

$$(\gamma_1 + c) + (\gamma_2 + c) + \dots + (\gamma_n + c)$$

$$= (y_1 + y_2 + \dots + y_n) + \underbrace{(c + c + \dots + c)}_n$$

$$= \left( \sum_{i=1}^n y_i \right) + nc = \sum_{i=1}^n (y_i + c)$$

so

$$\left( \frac{1}{n} \sum_{i=1}^n y_i \right) + c = \frac{1}{n} \sum_{i=1}^n (y_i + c)$$

↑  
 (old)  $\bar{y}$  mean of old

(new)

↑  
 mean of new

$\begin{bmatrix} y_1 \\ \vdots \\ y_n \end{bmatrix}$   
 mean  $\bar{y}$

add  $c$  →  $\begin{bmatrix} y_1 + c \\ y_2 + c \\ \vdots \\ y_n + c \end{bmatrix}$

mean  $\bar{y} + c$

6

$$\begin{bmatrix} 1 \\ 2 \\ 9 \end{bmatrix} \xrightarrow{\text{add } 3} \begin{bmatrix} 4 \\ 5 \\ 12 \end{bmatrix}$$

mean  $\frac{12}{3} = 4$

mean  $\frac{21}{3} = 7$