2015 APRIL 15

Hello,

I NEED HELP WITH:

I need some help with some statistical calculations regarding how much time is spent on classes, subjects, and homework at school. I am trying to calculate the mean average and what puzzles me is that when I use two different ways to calculate the answer I get two different results.

I think both of my methods are correct so I'm guessing that the reason for the discrepancy is because I used slightly different ways to derive my answer. However, I can't shake the feeling that the answers should be identical and I don't really understand why they are not.

I WOULD LIKE TO KNOW / NEED HELP WITH:

Which method is correct? Are both methods correct? Is one more accurate then the other, and if so, why? And if one method is wrong, then why?

MY CALCULATIONS AND METHODOLOGY:

- Raw data: *See* <u>APPENDIX A</u> on Page 3.

At Dalhousie University, the class schedule alternates every 2nd week. Every 2nd week there are a few more classes.

To calculate statistical averages, I began by calculating the "high average" and "low average" statistics first. "High" refers to the busiest week at Dalhousie and "low" to the least busiest. Afterward, my thought was to use the high and low statistics to then interpolate a "mean average" for a student's typical week at Dalhousie.

It seems to work pretty well except for when I try to calculate the "**Mean Average hours of instruction per week per subject**". I calculate it two different ways and get two slightly different answers. I'm not sure why the answers are different because both calculation methods seem logical and one assumes that they are just different methods of calculating the same thing and therefore should give the same answer.

- High average calculations: *See* APPENDIX B on Page 4.
- Low average calculations: *See* APPENDIX C on Page 7.
- Mean average calculations: *See* APPENDIX D on Page 9.

To calculate the "mean averages" I used the data from the "high average" and "low average" calculations.

I only ran intro trouble when I began calculating the **"Mean average hours of instruction per week per subject".** This is what I need help with.

Please see Pages 9 and 10 which will explain exactly what the problem is.

For anyone that helps, thank you in advance! ^_^

APPENDIX A
(RAW DATA)

HW=homework — This schedual is based on Dalhousie University

SUBJECT	TYPE	S	M	T	W	T	F	S	CLASS	HOMEWORK
									PER WEEK	
1. PHYSICS	LEC		1		1		1		3	
	LAB'	3'							3'5	
	HW									
	├ Weekly Assignment									6
	├ Pre-lab'									1.5'
	└ Study									4
2. ENGINEER.	LEC			1½		1½			3	
	LAB/TUT				3				3	
	HW									
	├ Weekly Assignment									3½
	└ Study									½
3. CHEMISTRY	LEC		1		.1		1		3	
	(LAB/TUT)'					3'			3'	
	HM									
	├ Prelab'									3'
	├ Postlab'									1½'
	├ Bi-monthly compl assignment									3/2'
	└ Study Questions									4
4. MATHEMATICS	LEC		1		1		1		3	
	HW									
	├ Weekly Assign.									2
	{ ├ Questions									6
	└ Study									
5. ENGLISH	LEC		1		1		1		3	
	HW									
	{ ├ Essay 6h/									} 3
	├ Reading 12/book									
	└ Study									

Endnotes:

1. One 3h class every two weeks.
∴ the equivilent of 1.5 h/week

APPENDIX B
(HIGH AVERAGE CALCULATIONS)

Data based on University of Dalhousie.

STATISTICS CALCULATIONS FOR DALHOUSIE:

HIGH AVERAGES

Plurals cancel out

buisest
busyest

* High*
Average Class Length $= \dfrac{\text{Total (maximum) \# of class hrs}}{\text{" (maximum) " classes}}$

* "High Average" in this case assumes that all labs and any semi-monthly assignments occur weekly instead of semi-monthly as is actually the case. This allows for the calculation of the busiest possible week.

$$= \frac{(6 + 6 + 6 + 3 + 3)\ h}{(4 + 3 + 4 + 3 + 3)\ class}$$

$$= \frac{24\ h}{17\ class}$$

$$= 1.4117\ldots\ h/class$$

* High* Average HRS Homework/Class $= \dfrac{\text{Total (maximum) hrs homework}}{\text{" (maximum) \# of classes}}$

$$= \frac{(11.5 + 4 + 12 + 8 + 3)\ h}{(4 + 3 + 4 + 3 + 3)\ class}$$

$$= \frac{38.5\ h}{17\ class}$$

$$= 2.264\ldots\ h/class$$

* (High* Average Class Length + (HRS HMRK)$_{max}$)/class $= \dfrac{\text{Total (maximum) \# of class hrs} + \text{Total (maximum) hrs hmrk}}{\text{Total (maximum) \# of classes}}$

$$= \frac{(24 + 38.5)\ h}{17\ class}$$

$$= \frac{62.5\ h}{17\ class}$$

$$= 3.67\ldots\ h/class$$

2

- Average # of classes per subject per week (High*) = $\dfrac{\text{Total # of classes (maximum) per week}}{\text{subjects per week}}$

$$= \dfrac{(4+3+4+3+3)\ \text{class per week}}{5\ \text{subject per week}}$$

$$= \dfrac{17\ \text{class}}{5\ \text{subject per week}}\ \text{per week}$$

$$= 3.4\ \text{class/subject per week}$$

- High* Average hrs of instruction & HMRK per week per subject = (High Average Class Length + HRS HMRK per class) (High Average # of classes per subject)

$\dfrac{\text{Total # of class h HMRK (max hrs)}}{\text{# "" "" subjects}} =$

$$= \dfrac{62.5\ h}{17\ \text{class}} \times \dfrac{17\ \text{class}}{5\ \text{subject per week}}$$

$$= 12.5\ h/(\text{subject/week})$$

- High* Average hrs of instruction per week per subject = (High Average class length)(High Average # of classes per subject)

$\dfrac{\text{Total # of HRS class (max)}}{\text{Total # subjects}} =$

$$= \dfrac{24\ h}{17\ \text{class}} \times \dfrac{17\ \text{class}}{5\ \text{subject per week}}$$

$$= 4.8\ h/(\text{subject/week})$$

3

- High* Average HRS of homework per week per subject = $\frac{\text{Total \# HRS HMRK}^{max}}{\text{" " subject}}$

$$= \frac{38.5 \ h}{5 \ \text{subject}}$$

$$= 7.7 \ h/\text{subject}$$

- Ratio between

  High average class length : High Average HRS HMRK/class

  $$\frac{24 \ h}{17 \ \text{class}} : \frac{38.5 \ h}{17 \ \text{class}}$$

  $$\frac{\frac{24 \ h}{17 \ \text{class}}}{\frac{38.5 \ h}{17 \ \text{class}}}$$

  $$1 : 1.604\overline{16}$$
  $$1 : \frac{77}{48}$$

  ∴ For every 1 unit of time spent in class, $\overset{a \ maximum \ of}{\frac{77}{48}}$ units of time are spent on homework.

APPENDIX C
(LOW AVERAGE CALCULATIONS)

Data based on UofD.

STATISTICS CALCULATIONS FOR DALHOUSIE:

LOW AVERAGES

* "Low average" in this case assumes that labs and any semi-monthly assignments do not occur. This allows for the calculation of the least busiest possible week.

- Low* average class length $= \dfrac{\text{Total minimum \# of class hrs}}{\text{''} \quad \text{''} \quad \text{''} \quad \text{''} \quad \text{''}}$

$$= \frac{(3 + 6 + 3 + 3 + 3)\,h}{(3 + 3 + 3 + 3 + 3)\,class}$$

$$= \frac{18\,h}{15\,class}$$

$$= 1.2\,h/class$$

- Low* average HRS HMRK/class $= \dfrac{\text{Total minimum HRS HMRK}}{\text{''} \qquad \text{''} \qquad \text{\# of classes}}$

$$= \frac{(10 + 4 + 4 + 8 + 3)\,h}{(3 + 3 + 3 + 3 + 3)\,class}$$

$$= \frac{29\,h}{15\,class}$$

$$= 1.9\overline{3}\,h/class$$

2

- Low* average # of classes per subject per week $= \dfrac{\text{Total minimum \# of classes per week}}{\text{" " " " subjects per week}}$

$$= \dfrac{(3+3+3+3+3)\ \text{class per week}}{5\ \text{subject}}$$

$$= 3\ \text{class/subject per week}$$

- Low* average HRS of homework per week per subject. $= \dfrac{\text{Total min.\# of HRS HMRK}}{\text{" " " \# of subjects}}$

$$= \dfrac{29\ h}{5\ \text{subject}}$$

$$= 5.8\ h/\text{subject}$$

- Ratio between

average class length : average HRS HMRK/class

$1.2\ h/\text{class} : \dfrac{29}{15}\ h/\text{class}$

$1 : \dfrac{29}{18}$

$1 : 1.6\overline{1}$

∴ For every 1 unit of time spent in class, an average of $\dfrac{29}{18}$ units of time are spent on homework.

APPENDIX D
(MEAN AVERAGE CALCULATIONS)

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Data based on U of D.

INTERPOLATING MEAN AVERAGE FROM HIGH AND LOW AVERAGES

- Average individual class length $= \dfrac{\text{Low average class length} + \text{High average class length}}{2}$

$$= \dfrac{(1.2 + \frac{24}{17}) \; \text{h/class}}{2}$$

$$= \dfrac{111}{85} \; \dfrac{\text{hrs}}{\text{classes}}$$

$$= 1.3058... \; \text{h/class}$$

- Average HRS Homework/class $= \dfrac{\text{Total min. HRS HMRK per class [possible]} + \text{Total max. HRS HMRK per class [possible]}}{2}$

$$= \dfrac{\frac{29 \, h}{15 \, \text{classes}} + \frac{38.5 \, h}{17 \, \text{classes}}}{2}$$

$$= \dfrac{2141}{1021} \; \text{hrs/classes}$$

$$= 2.099... \; \text{h/class}$$

- Ratio between

  average class length : average HRS HMRK/class

$$\tfrac{2}{3} \times \tfrac{4}{5} = \tfrac{8}{15} = 0.5\overline{3}$$

$$\frac{111 \, \text{hrs}}{85 \, \text{classes}} : \frac{2141 \, \text{hrs}}{1021 \, \text{classes}}$$

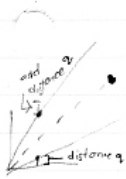$$1 : \frac{181985 \, \text{hrs}}{113331 \, \text{classes}}$$

$$1 : 1.6057... \; \text{h/class}$$

$\therefore$ For every 1 unit of time spent in class, an average of $\frac{181985}{113331}$ units of time are spent on homework.

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- Average # of classes $=$ $\dfrac{\text{Grand total \# of classes per week}}{\text{subjects}}$
  per subject per week

  This method → works because x-values are equal.

  x-values must be equal for this method to work.

  $= \dfrac{\text{Total min. \# of classes} + \text{Total max \# of classes}}{\text{Grand total \# of subjects}}$

  $= \dfrac{(3 \text{ class})5 + 17 \text{ class}}{(5 + 5) \text{ subject}}$ per week / per week

  $= 3.2$ class/subject per week

  Also can be calculated by:

  $\dfrac{\left(\begin{array}{c}\text{Low average \# of classes}\\ \text{per sub/week}\end{array}\right) + \left(\begin{array}{c}\text{High average \#}\\ \text{of classes per subject/week}\end{array}\right)}{2}$

  $= \dfrac{3 + 3.4}{2}$

  $= 3.2$

- Average HRS of instruction $=$ (mean average class length)(mean average # of
  per week per subject   classes per subject per week)

  $= \left(\dfrac{111}{85} \text{ h/class}\right)(3.2 \text{ class/subject/week})$
  $= \dfrac{1776}{425}$ h/subject/week
  $= 4.1788...$ h/subject/week

An alternative method for calculating the "Mean average HRS of instruction pers week per subject" gives a different answer:

$$\text{Mean Average HRS of instruction per week per subject} = \frac{\left(\begin{array}{c}\text{Low average HRS of} \\ \text{instruction per week} \\ \text{per subject}\end{array}\right) + \left(\begin{array}{c}\text{High average HRS of} \\ \text{instruction per week} \\ \text{per subject}\end{array}\right)}{2}$$

$$= \frac{\left(\begin{array}{c}\text{Low average \# of classes/} \\ \text{subject/week}\end{array}\right) \times \left(\begin{array}{c}\text{Low average HRS} \\ \text{class length}\end{array}\right) + \left(\begin{array}{c}\text{High average \# of} \\ \text{classes/subject/week}\end{array}\right) \times \left(\begin{array}{c}\text{High average HRS} \\ \text{class length}\end{array}\right)}{2}$$

$$= \frac{\left(\dfrac{3 \text{ class}}{\text{subject}\cdot\text{week}}\right)\left(\dfrac{1.2\, h}{\text{class}}\right) + \left(\dfrac{\frac{17}{5}\, \text{class}}{\text{subject}\cdot\text{week}}\right)\left(\dfrac{24\, h}{17\, \text{class}}\right)}{2}$$

$$= 4.2 \ h/\text{subject}/\text{week}$$

I don't understand why this method here gives 4.2 as the answer and the other method gives 4.1788... as the answer. To me, it seems they should be the same but they are obviously not.

Can anyone please explain why or if I did anything wrong. Or, if both answers are technically correct, then which one is more accurate?

Help please! Thanks! ^_^