

Using Spreadsheets to Generate Unique Data Sets for Student Homework Assignments

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Students sharing their work with each other on math-heavy assignments such as genetics problems is a constant concern. Instructors can use spreadsheets to easily generate a unique data set for each student. This workshop outlines techniques that can be used to create these spreadsheets

Keywords: spreadsheet, data analysis, graphing

Link To Supplemental Materials: <https://doi.org/10.37590/able.v42.sup34>

Introduction

Students sharing their work with each other on math-heavy assignments such as genetics problems is a constant concern. Instructors can use spreadsheets to create a data set that is not only unique to each student, but also easily reproducible. Students enter information that is specific to them, e.g., their student ID number or name, and the spreadsheet uses hidden formulas and lookup tables to generate a unique data set. The instructor can enter the same values and the spreadsheet will produce the same data as well as a grading key. The complexity of the calculations used to create the data set is up to the instructor.

Tips and Tricks

There are a nearly limitless number of ways that you can manipulate the numbers that students enter to produce unique data sets. Here are some general notes and a list of functions that I have found to be particularly useful.

Notes

- The techniques here work in both Excel and Sheets. An Excel version is included with the supplemental materials.
- Sheets protection: In addition to hiding and protecting information on your spreadsheet, you can set up a Google Sheet so that the users must make a copy to use it. This provides one more way to prevent people from accidentally altering the original. To do this, copy the link and then replace the text after the final slash with “copy”
 - For example,
<https://docs.google.com/spreadsheets/...m8lhow/edit?usp=sharing>
would become
<https://docs.google.com/spreadsheets/...m8lhow/copy>
- ID numbers: Be sure to pay attention to patterns in ID numbers. For example, for a couple of years all our numbers start with 11. It doesn't make much sense to use them in the calculations.
- Random numbers are volatile and change whenever you make any change to a sheet. See the random numbers page on the spreadsheet for more information about this.

- Be sure to check your spreadsheet with a wide range of inputs.
- Make a version of the spreadsheet to use when grading the students' work. For example, if they are calculating diversity index values for a data set, set up the spreadsheet to automatically do that. This significantly cuts down on grading time.
- This work was inspired by Menk and Malone (2015). They provide a lot of detailed examples of ways to create unique data sets.

Useful Functions

- ABS - returns the absolute value - helpful when you don't want negative values
 - =ABS(-7) = 7
- CONCATENATE - this joins the contents of 2 or more cells. Want a 2 digit number based on 2 single digit numbers? This is your tool.
 - =CONCATENATE(A1,A2) If A1 contains 1 and A2 contains 3, this would produce 13
- IF - For making conditional statements
 - =IF(logical_test, value_if_true, value_if_false)
 - =IF(A2>=8,A2,A2+4)
- LEN - to count the number of characters in a string
 - =LEN(B2)
 - If B2 contains ABLE2021, this would produce 8

Acknowledgments

Thank you to John Buchner for inspiring this project and sharing his growth curve spreadsheet. I would also like to express appreciation for the support received from the Biological Sciences Program for the development of new lab exercises.

- MID - to pull out a character, or characters, from a longer string
 - =MID(string, starting_at, extract_length)
 - =MID(aardvark, 2, 2) would produce "ar"
- RAND - calculates a random value between 0 and 1
 - =RAND()
- RANDBETWEEN - calculates a random integer between 2 values you choose.
 - =RANDBETWEEN(7,12)
- ROUND - rounds to a specific number of decimal places
 - =ROUND(23.456,1) rounds to 1 decimal place = 23.5
 - See also ROUNDUP and ROUNDDOWN
- VLOOKUP (or HLOOKUP) - these allow you to match columns or rows of data and is a great way to convert letters to numbers

Cited References

Menk KB, Malone S. 2015. Creating a Cheat-Proof Testing and Learning Environment: A Unique Testing Opportunity for Each Student. *Advances in Accounting Education: Teaching and Curriculum Innovations* 16:133-161.

About the Author

Hans is the Lab Coordinator for the Principles of Ecology and Evolution Lab (BSCI161) at the University of Maryland. He holds a B.A. in Biology from St. Mary's College of Maryland, an M.S. in Entomology from the University of Maryland, and an M.D.E. in Distance Education from University of Maryland, University College. His current research focuses on educational outcomes in laboratory and online settings and a survey of tiny Miocene shark and ray fossils found along the Chesapeake Bay.

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Citing This Article

Hans D. Lemke. 2022. Using Spreadsheets to Generate Unique Data Sets for Student Homework Assignments. Article 34 In: Boone E and Thuecks S, eds. *Advances in biology laboratory education*. Volume 42. Publication of the 42nd Conference of the Association for Biology Laboratory Education (ABLE). <https://doi.org/10.37590/able.v42.art34>

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