

Modeling Problem – Choosing a Mode of Travel Part 2 – Developing your Algorithm (Plan for Coding)

Problem:

If you did not complete the first submission for this problem (Part 1 – Developing your Mathematical Model), please refer to that assignment for details about this problem.

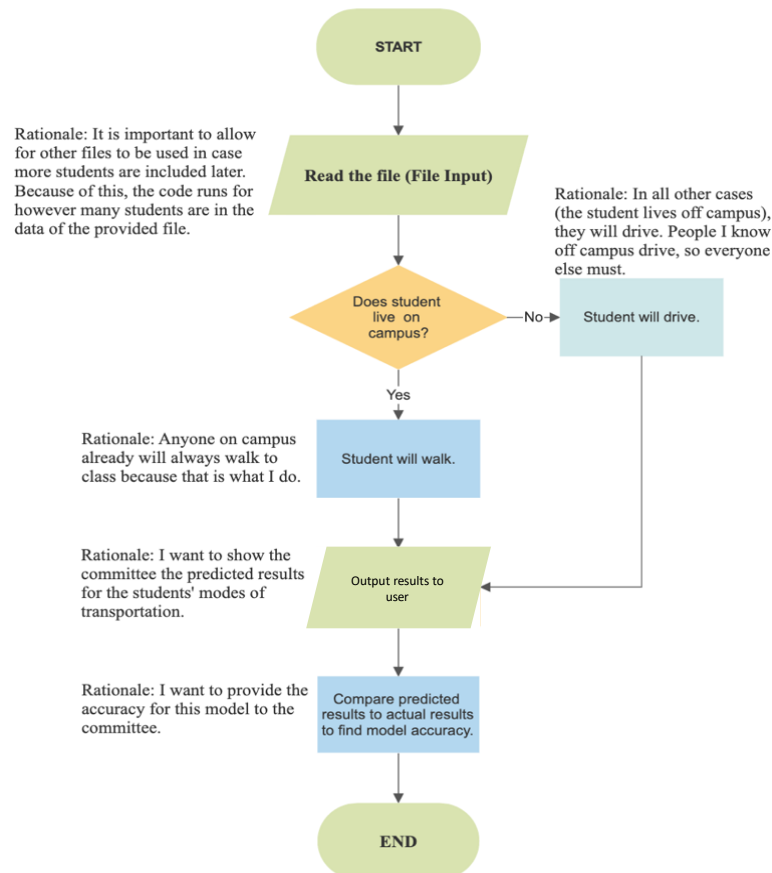
The Parking Committee was impressed with many of the solutions they received, they have decided to have everyone further develop their solutions based on a slightly larger data set with more information based on your feedback (i.e. where students live on campus (if on campus), how many miles students live away from campus (if off campus), and if they have roommates). Remember to ensure your solution works with any number of students as the committee will be working to increase the survey participants. Also, it can be beneficial to test your model with additional test data by creating sample student data based on you and your peers.

Submissions:

Please note that the submission for this assignment is different than any of your homework assignments. This modeling problem is worth 10% of your grade. This submission is worth 2% of your final grade (recall the written model submission previously submitted was worth 4% of your final grade). **This submission is an algorithm/pseudo code based on your previously submitted written model.** You are encouraged to improve your previously written model, especially if the newly provided data impacts your ideas; this is not a requirement though. **This assignment will be due in about one week and must be completed INDIVIDUALLY** (refer to Canvas for exact dates). Later you will receive a final assignment to complete this problem: the 3rd submission (coded solution / computational model).

- (Part 2) Your **pseudo code** – for this submission you must complete the Engineering Process (Steps 5, 6, and part of 7 only), as described in the document. Your submission **MUST BE TYPED or drawn in a computer program (e.g., PowerPoint, Word)**. Throughout your algorithm you must explain the corresponding step/s and why you solved the problem the way you did – meaning you must explain your *rationale* for designing the step the way that you did (*refer to the example provided in the image below*). (For some steps and rationale, you may just copy text from your previous submission.) In addition to your algorithm, you must provide the outputs of your solution based on the provided data.

- Example of what you could do with a flowchart is shown below. You are not required to show what you changed from your written solution. You are required to provide a rationale for each step of your code (as shown in the boxes). Below is a solution that provides a poor algorithm example that was brought up in the previous assignment. In this case, anyone who lives on campus walks and the rest will drive. However, this solution provides plenty of rationale and neatly depicts the intended algorithm.



Solution:

For more details on the 7 Steps of the problem solving process refer to the previous submission (Part 1 – Developing your Mathematical Model). Some information for the steps are provided below, but there are more details in the first document.

1. Decipher Problem Statement

Givens (inputs):

The updated data set that now has 25 students with 12 different pieces of information about their living situation and access.

Finds (outputs):

(1) The resulting predictions based on your model for the given data set and (2) the accuracy of the model.

2. Draw a Diagram

3. Identify Relevant Theory

Some of the relevant background information for this problem is the survey data provided by the Parking Committee (see the provided data set of the 25 students on the last page).

4. Assumptions

5. Solution Steps

Build off of the model you developed for your previous submission to complete this assignment. For this submission, you will show/explain your steps throughout your algorithm (or explain your coding approach under each step) (as shown in the flowchart example above). It will probably help to use your Step 5 from your previous submission for this assignment.

You should NOT have a separate section for this step. Again your process (steps) along with coding layout should be shown together like the flowchart example.

6. Identify Results and Verify Accuracy

This is the step where you will generate your outputs that were previously established in Step 1 Finds: (1) the predictions for each student and (2) the accuracy of the model.

Apply your developed process to the provided data set. You can use a computer application (e.g., Excel, MATLAB) to help you with your calculations, BUT submitting work in an Excel file (or other) without explanations in your word document is not acceptable. Even if you submit an Excel file or other program to apply your process, you MUST still explain every step of your solution in the written document. It is also recommended to use one of the data points as an example of how to apply your model.

7. Algorithm and Code

Your solution steps will lay out the process that you will need to code. In complex problems that require conditionals and/or repetition, it may be beneficial to draw out a flowchart, concept map, etc. or write out bullet point or numbered steps. Doing this step can ensure you understand the flow of your code before you start writing code in MATLAB.

Since you are tasked with developing a pseudo code and NOT coding your model yet, you will only be completing part of this step for this assignment. Once complete, you should have a well-formed mathematical model that can be directly implemented into a program (computational model). Code will only be written for the final submission.

Student:	TRAVEL MODE:	On- Campus or Off- Campus:	If ON Campus:	If OFF Campus:	Have Roommates?	Own A Car:	Parking Pass:	Own A Bike:	Bike Registration:	Own a Bike Lock:	Lease-A- Lock:	Own A Skateboard, Longboard, other?
1	walk	ON	O'Connor Hall	NaN	Y	Y	\$150 /year	N	Free	N	\$35/lock (refundable)	N
2	walk	ON	Adams Hall	NaN	Y	Y		N		N		N
3	walk	ON	Doolittle Hall	NaN	Y	Y		N		N		N
4	walk	ON	Apollo Hall	NaN	Y	Y		N		N		N
5	bike	ON	Adams Hall	NaN	Y	Y		Y		N		Y
6	board	ON	Wood Hall	NaN	N	Y		Y		N		Y
7	board	ON	Chanute Hall	NaN	Y	Y		Y		N		Y
8	bike	ON	Chanute Hall	NaN	Y	Y		Y		Y		Y
9	bike	ON	O'Connor Hall	NaN	Y	Y		Y		N		Y
10	walk	ON	Wood Hall	NaN	Y	Y		Y		N		Y
11	walk	ON	New Residence Hall	NaN	Y	Y		Y		Y		Y
12	walk	ON	Chanute Hall	NaN	N	Y		Y		N		Y
13	walk	ON	Wood Hall	NaN	Y	Y		Y		Y		Y
14	bike	OFF	Not Applicable	2	N	Y		Y		Y		N
15	bike	OFF	Not Applicable	0.3	N	Y		Y		Y		N
16	drive	OFF	Not Applicable	5.1	N	Y		Y		N		N
17	uber	OFF	Not Applicable	3	Y	Y		Y		N		N
18	drive	OFF	Not Applicable	5.7	N	Y		Y		Y		N
19	drive	OFF	Not Applicable	2.2	Y	Y		Y		N		N
20	drive	OFF	Not Applicable	8.1	Y	Y		Y		Y		N
21	drive	OFF	Not Applicable	5	Y	Y		Y		Y		N
22	carpool	OFF	Not Applicable	3.6	Y	Y		Y		N		N
23	drive	OFF	Not Applicable	5.3	N	Y		Y		Y		N
24	drive	OFF	Not Applicable	7.8	N	Y		Y		Y		N
25	drive	OFF	Not Applicable	5.3	Y	Y		Y		Y		N

