# Practice 1: Teach Us! Design an Algorithm

One thing that makes this class unique is that you have to invent solutions to problems and create things all the time, both alone and with others. Everyone has a unique and creative perspective they bring to the table. What's something that you know a lot about and could teach somebody?

When we teach someone something, we break it down into steps they can follow. This is the same when we are designing programs to solve a problem. Planning your program before you start coding is part of the development process. For this discussion, you will be planning out the steps to teach the class something you know a lot about.

**In this document, you will:**

* Write a detailed description of what you will be teaching us how to do
* Include a picture of what the final outcome will look like after following your steps
* Identify the inputs we will need
* Identify any calculations or formulas needed (if necessary)
* Identify the outputs as a result of following the steps
* Write the algorithmic steps as pseudocode or a flowchart ([draw.io](https://app.diagrams.net/) is a free flowchart tool)

## Description

In the box below, describe what we will be learning how to do.

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| **Description:** |
| It happens to most drivers at least once, sometimes more, but getting a flat tire is never fun. We’ll walk through step by step how to change your tire and get you back on the road quickly and safely. |

## Sample Run

When you begin coding in this course, you will start with the end in mind. This is called the **Sample Run**. For this discussion, your sample run will be what the final outcome will be if we follow your steps!

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| **Sample run:** |
| Once the spare tire has been replaced, it will look like this. |

## Algorithmic Design

Before you begin coding, **you must first plan out the logic** and think about what data you will use to test your program for correctness. All programmers plan before coding - this saves a lot of time and frustration! You will mimic this process for your algorithm, without code. Use the steps below to identify the inputs and outputs, calculations, and steps needed to solve the problem.

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| **Algorithmic design:** |
| 1. Identify and list all of the user input and their data types. |
| Spare tire, hydraulic jack (or scissor jack), jack stand, wheel chalks, tire iron. |
| 1. Identify and list all of the user output and their data types. |
| Inflated spare tire on your vehicle. |
| 1. What calculations do you need to do to transform inputs into outputs? List all formulas needed, if applicable. If there are no calculations needed, state there are no calculations for this algorithm. |
| No calculations needed. |
| 1. Design the logic of your program using pseudocode or flowcharts. Walk through your logic steps to make sure you get the same output as the sample run above. |
| **Pseudocode:**   * + 1. **Gather necessary tools.**     2. **Chock wheels to avoid the car rolling backwards.**     3. **Loosen lug nuts with tire iron, just enough to break the seal.**     4. **Locate a secure section of the vehicles frame near the tire.**     5. **Place car jack directly underneath located spot.**     6. **Crank jack to slowly lift vehicle.**     7. **Stop cranking when the deflated tire is 1 inch off the ground.**     8. **Adjust height on jack stand and secure stand with locking pin.**     9. **Place jack stand behind the tire, but under the frame.**     10. **Slowly lower the jack, so vehicle rests on stands.**     11. **Continue loosening lug nuts until all are removed.**     12. **Remove tire from wheel assembly.**     13. **Grab Spare tire and align struts with the lug nut guiding holes.**     14. **Gently place spare tire on wheel assembly.**     15. **Hand tighten each lug nut to the wheel.**     16. **Pick a lug nut to start.**     17. **Tighten with tire iron until firm.**     18. **From starting lug nut, move clockwise to the third lug nut.**     19. **Repeat steps 16 - 18 until there are no loose lug nuts.**     20. **Crank vehicle up an inch above jack stands.**     21. **Remove jack stands.**     22. **Slowly lower the vehicle back to the ground.**     23. **Repeat steps 16 – 18 to securely tighten lug nuts a final time.** |

## Submit

When you are finished with your planning document, upload it to the Practice 1 assignment folder in D2L.