**LaTex Code for Reporting Findings**

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**What is LaTex Code?**

LaTeX is a typesetting system used to produce high quality documents. It is especially popular in academia, particularly in fields that involve complex mathematical equations, such as physics, mathematics, computer science, and engineering. LaTeX was created by Leslie Lamport in the early 1980s as a set of macros on top of Donald Knuth’s TeX typesetting system. The goal was to make it easier for authors to create well-formatted documents without needing to learn the low-level programming of TeX. It was invested to solve the problem of inconsistent and low-quality formatting in technical and scientific writing. LaTeX is particularly useful for some of the following tasks:

* Writing documents with complex mathematical formulas.
* Creating professional-looking articles, theses, and books.
* Automating consistent formatting of citations, references, and numbering.
* Producing scientific papers in journals with specific formatting requirements.
* Collaborative writing, especially when using version control like Git.

LaTeX uses plain text files and markup commands, which gives users fine-grained control over the document layout and structure.

**What is Overleaf?**

Overleaf is an online LaTeX editor that allows users to write, edit, and collaborate on LaTeX documents directly in a web browser. It requires no installation and works entirely in the cloud. You can create an Overleaf at this [link](http://overleaf.com/). There are many reasons to use Overleaf for your documents:

* Real-time collaboration: Multiple users can edit a document at the same time, similar to Google Docs.
* No setup required: Overleaf handles all the LaTeX installations and packages for you.
* Version control: Keeps track of changes and allows you to revert to previous versions easily.
* Rich features: Includes autocomplete, error highlighting, and a built-in PDF preview.
* Integration: Works with GitHub, Dropbox, and references managers like Zotero.

**How Do We Code in LaTeX?**

**Creating A New Document**

A screenshot of a computer

AI-generated content may be incorrect.Once you have created your Overleaf account, log in. In the upper lefthand corner select “New Project” > “Blank Project” and give your new project a name. Then click create. You will be directed to a new page that looks like the one below.

On the left you will see a window into which we will insert our LaTeX code. On the righthand side of the screen, you will notice a PDF document preview. This is the output of our LaTeX code. Overleaf provides us the power to compile our files prior to downloading them. Congratulations! You have now made your very first LaTeX document.

A hand holding a small turtle

AI-generated content may be incorrect.**Adding Sections to Your Document**

First things first, let’s decide what we would like our document topic to be. I’ll be writing up a report on the Northern Diamondback Terrapin. The Diamondback Terrapin is a type of turtle that lives in brackish water in the eastern and southern United States. I also find these guys to be particularly adorable. I mean, take a look at the hatchling in the photo. That’s just precious.

Now, I would like to add the following sections to my document:

* Introduction
* Habitat
  + Range
  + Habitat and Water
* Diet
  + Ghost Shrimp
  + Spearing
  + Clams
* Threats
  + Habitat Loss
  + Crab Traps
  + Road Mortality
  + Climate Change

To do this we use the “\section{}” argument. And, if we would like to subsections, the “\subsection{}” argument. Let’s move over to our Overleaf document and add these sections as an outline for our write-up.

**Adding Text to Your Document**

Now that we have a decent outline for what we would like to document, let’s add some text. I’ll be adding the following text to each of the sections:

* Introduction

Diamondback terrapins are a unique species of turtle known for the distinctive diamond-shaped patterns on their shells, which give them their name. These medium-sized turtles are native to the brackish coastal waters of the eastern and southern United States. Unlike many other turtles, terrapins are well-adapted to living in environments where salt and freshwater mix. They are an important part of their ecosystems and have long fascinated scientists and nature enthusiasts alike for their striking appearance and interesting behaviors.

* Habitat
  + Range

Diamondback Terrapins are found along the Atlantic and Gulf coasts of the U.S., from Cape Cod, Massachusetts, to Texas.

* + Environment and Water

Diamondback terrapins are most commonly found in salt marshes, estuaries, tidal creeks, and mangrove swamps. They prefer brackish water – where freshwater from rivers and streams meets the saltwater of the ocean—and are especially associated with costal wetlands. These habitats provide terrapins with shelter, nesting areas, and abundant food sources. During colder months, they often burrow into the mud or sand at the bottom of creeks or marshes to hibernate.

* Diet
  + Ghost Shrimp

Ghost shrimp are small, burrowing crustaceans that live in sandy or muddy coastal habitats, especially in estuaries and tidal flats. Despite their name, they’re not true shrimp, but they do have long slender bodies and a mostly transparent appearance – hance the name “ghost”. Ghost shrimp are excellent diggers and spend much of their time creating complex tunnel systems beneath the surface, which provide shelter and help oxygenate the sediment. They feed by sifting through sand or mud for tiny bits of organic matter, playing an important role in keeping their ecosystems healthy. Ghost shrimp are also a food source for many fish, birds, and other marine animals.

* + Spearing

Spearing, also known as Atlantic silversides, are small, slender fish commonly found in coastal waters along the Atlantic Ocean and Gulf of Mexico. They have a shiny stripe running along their sides, which helps them blend in with the water and avoid predators. Spearing are important members of the food web, serving as prey for many larger fish, birds, and even turtles like the Diamondback Terrapin.

* + Clams

Hard clams, Razor Clams, and Soft clams are also sources of sustenance for the Diamondback terrapin. Terrapins use their sharp, powerful beaks to crush clam shells. Fun fact, clams are an integral part of the health of a marine ecosystem, they filter water and help maintain water quality.

* Threats
  + Habitat Loss

Diamondback Terrapin have recently suffered substantial loss of habitat due to coastal development and pollution. This has greatly reduced the areas where they can safely live and nest.

* + Crab Traps

Many terrapins are accidentally killed in crab traps, where they become trapped and drown.

* + Road Mortality

Road mortality is another concern, especially for females crossing roads to reach nesting sites.

* + Climate Change

Climate change and sea level rise further compound these issues, posing long-term risks to their populations. Conservation efforts are underway in many areas to protect terrapins and their habitats, but continued action is essential for their survival.

To add the above text write or copy and paste the above text below each of the appropriate sections in our Overleaf document.

**Changing Font Sizes**

Great! We have added text to our document! But I find the text a bit too small. Let’s increase the font size. To change the font size, add this line to the beginning of each if your sections: **\fontsize{18}{21}\selectfont**. This changes the font size to 18.

If you would like to increase the font size of the section and subsection titles, you can insert the following code at the top of the document:

**\usepackage{titlesec} % Include titlesec for title formatting**

**% Define font sizes for section and subsection titles while keeping numbering**

**\titleformat{\section}**

**{\fontsize{22}{26}\selectfont\bfseries} % Format for section titles**

**{\thesection}{1em}{}**

**\titleformat{\subsection}**

**{\fontsize{20}{24}\selectfont\bfseries} % Format for subsection titles**

**{\thesubsection}{1em}{}**

To change the font size of the title, author, and date you can insert the following code:

**\renewcommand{\maketitle}{**

**\begin{center}**

**{\fontsize{24}{28}\selectfont\bfseries Foundations of Data Science LaTeX Tutorial} \\[1em] % Title**

**{\fontsize{24}{28}\selectfont Author: Noelle Kosarek} \\[1em] % Author**

**{\fontsize{24}{28}\selectfont Fall 2025} % Date**

**\end{center}**

**}**

**Increasing and Decreasing Margins**

Under \documentclass{article} insert the following to change your document to 1inch margins all around: **\usepackage[a4paper, left=1in, right=1in, top=1in, bottom=1in]{geometry}**.

**Increasing and Decreasing Line Spacing**

To increase and decrease line spacing by section, add the following line to the top of the document**: \usepackage{setspace}**. Next, insert the following line before your fontsize arguments: **\begin{spacing}{1}**. Also make sure the add this line at the end of the sections you wish to end that spacing: **\end{spacing}**. Here we do that right before the next section.

**Adding Images**

You can use this code to add an image of an adult terrapin provided to you in the “image” directory from Canvas to your LaTeX document:  
  
**\begin{figure}[h] % The [h] option suggests positioning "here".**

**\centering % Center the image**

**\includegraphics[width=0.75\textwidth]{images/diamondback\_tarrapin\_adult.jpg} % Scale the image to 75% of the text width**

**\caption{This is an adult Terrapin} % Caption for the image**

**\label{This is an adult terrapin} % Label for referencing the image in the text**

**\end{figure}**

And you can paste this code to add an image of the hatchling:

**\begin{figure}[h] % The [h] option suggests positioning "here".**

**\centering % Center the image**

**\includegraphics[width=0.75\textwidth]{images/diamondback\_terrapin\_hatchling.jpeg} % Scale the image to 75% of the text width**

**\caption{This is a hatchling.} % Caption for the image**

**\label{This is a hatchling.} % Label for referencing the image in the text**

**\end{figure}**

**Adding Mathematical Formulas**

One important calculation conservation biologists use is a population size calculation. The formulation for population size is N = (n/p) \* (1/(1-p)). Where N is the estimated total population size, n is the number of observed units, and p is the probability that an individual is selected in a survey. Now, when we type this out, it looks ugly. LaTeX provides us the power to write out these formulas in a prettier format that, honestly, conveys what they mean a bit better and doesn’t leave error in interpretation. Instert the description of calculating the population statistic below in a new section called “Population Calculation” along with the formula.

**Population Size Estimation refers to the process of calculating the total number of individuals in a population based on data from a sample. This process is crucial in various field including ecology, sociology, epidemiology, and economics, as it provides a quantitative understanding of the size of a population, which can then be used to inform decisions and policies. Here is the formula for estimating a population from a sample:**

**\[**

**N = \frac{n}{p} \cdot \frac{1}{1 - p}**

**\[**

**Conclusions**

In today’s tutorial we learned how to generate nicely formatted LaTeX documents using the online editor Overleaf. Specifically, we learned how to create new documents, add text, change font and margin sizes, increase and decrease spacing, add images, and add mathematical formulas. There is a huge range of formatting options in LaTeX, so this tutorial simply brushes the surface of what is possible. You might want to refer to the [Overleaf documentation](https://www.overleaf.com/learn) to add anything you would like to change to your custom documents. You will be expected to turn in your final report with a LaTeX document!