Various (LaTeX) Layouts, Environments, and Useful Settings

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Document Purpose

This documents purpose is to outline various LaTeXstyles and useful settings/environments to be used either in conjunction with each other or individually within any LaTeXdocument. Throughout this document I try to explain the code in each element as well as use the code itself within the document so that it is to be reproducible and editable easily. Using hte package "listings", the LaTeXcode can be displayed in a fancy box whenever referenced. Below is the code that determines the style of the code blocks that will be displayed in this document. What it dies is change the default style to what we desite and then set the lst style to the default value.

```
%Allows us to use listings for writing code chunks in fancy blocks.
\usepackage{listings}

%defines some new colors
\definecolor{backcolour}{rgb}{0.95,0.95,0.92}
\definecolor{commentcolour}{rgb}{.00,.245,.0}

%defines the lstlisting style for a language
\lstdefinestyle{}{language=, tabsize=3, backgroundcolor=\color{backcolour},
    breaklines=true, basicstyle=\footnotesize, showstringspaces=false, commentstyle=\
    color{commentcolour}, keywordstyle=\color{blue}}
\lstset{style=}
```

The above code is implemented simply by using the beginlstlisting and endlstlisting commands. It is important to note it is not easy to code LaTeXcode chunks within LaTeXitself so I will further assume the reader has basic knowledge of how to implement definitions within the document once they are set up and only occasionally give explicit examples.

Mathematical Commands

Matrices

Matrices are useful in mathematics and often tedious to write in LaTeX. We can define some new commands to make these slightly simpler. First, suppose we want to show the 3-dimensional curl of two vectors in cartesian coordinates. Then we would be required to write something such as

$$\text{curl } \vec{A} = \begin{vmatrix} \hat{x} & \hat{y} & \hat{z} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ A_x & A_y & A_z \end{vmatrix} = \left(\frac{\partial A_z}{\partial y} - \frac{\partial A_y}{\partial z}\right)\hat{x} - \left(\frac{\partial A_z}{\partial x} - \frac{\partial A_x}{\partial z}\right)\hat{y} + \left(\frac{\partial A_y}{\partial x} - \frac{\partial A_x}{\partial y}\right)\hat{z} \qquad (1)$$

Consider the following definition that enables us to write this in a very simple manner.

```
%
\newcommand{\curl}[1]{
\textrm{curl }\vec{#1}
}%

%
\newcommand{\curlCartesian}[3]{
\begin{vmatrix}
\hat{x} & \hat{y} &\hat{z} \\
\frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial
    z} \\
#1 & #2 & #3 \\
\end{vmatrix}
```

```
}%

%
\newcommand{\curlCartesianExpanded}[3]{
\left(\frac{\partial #3}{\partial y}-\frac{\partial #2}{\partial z}\right)\hat{x}-\
    left(\frac{\partial #3}{\partial x}-\frac{\partial #1}{\partial z}\right)\hat{y
    }+\left(\frac{\partial #2}{\partial x}-\frac{\partial #1}{\partial y}\right)\hat{
    z}
}%
```

To call this command and write our desired code, it simply takes

```
\curl{A} = \curlCartesian{A_x}{A_y}{A_z} = \curlCartesianExpanded{A_x}{A_y}{A_z}
```

Proofs, Lemma's, Theorem's, Definitions and Their Layouts

Definitions

3.1: Definition

Text in a box