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\documentclass{article}

\usepackage[utf8]{inputenc}

\usepackage[shortlabels]{enumitem}

\usepackage{listings}

\usepackage{amsmath}


\title{Lab 1}

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\begin{document}


\maketitle


\section*{Questions}

\begin{enumerate}[(a)]

\item To compile my program, I used the command: \textit{gcc -o vector vector.c -lm} and it compiled successfully.

\item

\begin{enumerate}[label=\roman*.]

\item The length of vector  $u$ ,  $m = ||u||$ :

\begin{lstlisting}[language=bash]
Length of vector u is: 5.790510
\end{lstlisting}

\item For  $\alpha=0.45$  and  $\beta=0.65$ ,  $w_1 = \alpha * u + v$ , and so  $w_1 =$ 

\begin{lstlisting}[language=bash]
Vector w_1 = [0.900100, 35.040001, 1719.555054]
\end{lstlisting}

\item For  $w_2 = \beta * u + v$ ,  $w_2 =$ 

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\begin{lstlisting}[language=bash]
Vector w_2 = [0.000165, 56.924999, 2833.330566]
\end{lstlisting}

\item For  $a = \langle u, v \rangle$ , or the inner product of  $u$  and  $v$ ,  $a =$ 
\begin{lstlisting}[language=bash]
Inner product of vectors u and v:
a = 9142.402344
\end{lstlisting}

\item  $\hat{u} = u / \|u\|$ , a normalized version of vector  $u$  and  $\hat{u} =$ 
\begin{lstlisting}[language=bash]
Normalized version of vector u:
[0.345393, 0.207236, 0.915291]
\end{lstlisting}

\item  $\hat{v} = v / \|v\|$ , a normalized version of vector  $v$  and  $\hat{v} =$ 
\begin{lstlisting}[language=bash]
Normalized version of vector v:
[0.000000, 0.020087, 0.999798]
\end{lstlisting}
\end{enumerate}

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\item To modify my code to make it work for vectors of length 10, I would normalize it to get the vector to a length of 1 and then multiply it by 10 and work with this new vector.

\item To make my print function "useful," I made sure to include brackets to the vector being printed and commas after each value, separating each vector component, except the last component. I made sure the output of my vector print function could be copy and pasted and used elsewhere as a standard vector with no issues.

\item The only error checking that made sense for me to provide was in my normalize function because I divide each vector component by a float value I named length which could potentially be 0 and dividing by 0 is undefined. I set an `\textit{if}` statement such that if length ever equaled to 0, my function would return 1, an error.

\item I gave assistance to Shaan Chudasama and Emily Mahr about C-programming, specifically pointers.

\end{enumerate}

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