\documentclass{article}

\usepackage[utf8]{inputenc}

\usepackage{enumerate}

\usepackage{listings}

\usepackage{graphicx}

\usepackage{tabularx}

\title{Lab 4}

\author{Jack Jiang}

\date{March 21, 2021}

\begin{document}

\maketitle

\section\*{Questions}

\begin{enumerate}[(a)]

\item

\begin{lstlisting}[language=bash]

#!/bin/bash

#SBATCH --nodes=1

#SBATCH --ntasks-per-node=1

#SBATCH --cpus-per-task=64

#SBATCH --time=00:30:00

#SBATCH --partition=normal\_q

#SBATCH --account=cmda3634\_rjh

\end{lstlisting}

\item

\includegraphics[time]{TimePlot.png}

\item Times are cut in half when the number of processors doubles until $T=32$ because there are only 32 threads so it is the fastest possible time already at T=32 threads.

\item For $T=32$ and $N=2^4^0$, I estimated it would take around 2 hours to compute.

\item

\begin{tabular}{|c|c|}

\hline

N& Digits of \pi

\\

\hline

$2^1^0$& Around $1$

\\

\hline

$2^1^3$& Around $2$

\\

\hline

$2^1^6$& Around $3$

\\

\hline

$2^1^9$& Around $3$

\\

\hline

$2^2^2$& Around $4$

\\

\hline

$2^2^5$& Around $4$

\\

\hline

$2^2^8$& Around $5$

\\

\hline

$2^3^1$& Around $4$

\\

\hline

\end{tabular}

\newline

Looking at the data, T does not seem to matter for the number of digits of $\pi$ accurately estimated.

\item No assistance given nor received.

\end{enumerate}

\end{document}