```
\documentclass[12pt]{article}
\usepackage{geometry}
\usepackage{listings}
\usepackage{color}
\usepackage{graphicx}
\usepackage{hyperref}
\usepackage{fancyhdr}    % For custom headers and footers
\usepackage{geometry}    % For setting page margins
\usepackage{amsmath}     % For advanced mathematical formatting
\usepackage{hyperref}    % For hyperlinks
\usepackage{float}

% Page margins
\geometry{
    a4paper,
    left=1in,
    right=1in,
    top=1in,
    bottom=1in
}

% Header and Footer settings
\pagestyle{fancy}
\fancyhf{} % Clear all header and footer fields
\fancyhead[L]{\textbf{Assignment : 2}}         % Left header
\fancyhead[R]{\textbf{FAST NUCES}}     % Right header
\fancyfoot[C]{\thepage}                % Center footer with page number

% Title Information

\date{Oct 25,2024} % No date

% Page settings
\geometry{
    a4paper,
    total={170mm,257mm},
    left=20mm,
    top=20mm,
}

% Listings settings
\definecolor{codegreen}{rgb}{0,0.6,0}
\definecolor{codegray}{rgb}{0.5,0.5,0.5}
\definecolor{codepurple}{rgb}{0.58,0,0.82}
\definecolor{backcolour}{rgb}{0.95,0.95,0.92}

\lstdefinestyle{mystyle}{
    backgroundcolor=\color{backcolour},
    commentstyle=\color{codegreen},
    keywordstyle=\color{blue},
    numberstyle=\tiny\color{codegray},
    stringstyle=\color{codepurple},
    basicstyle=\ttfamily\footnotesize,
    breakatwhitespace=false,
    breaklines=true,
    captionpos=b,
    keepspaces=true,
    numbers=left,
    numbersep=5pt,
    showspaces=false,
    showstringspaces=false,
    showtabs=false,
    tabsize=2
}

\lstset{style=mystyle}

\title{Task \# 10}
\author{Muhammad Shafeen\\
    FAST University Peshawar\\
    Department of Computer Science\\
    Course: Operating System\\
    Instructor: Saad Ahmad}


\begin{document}
    \section{Kill Command}
    This command is used to politely kill the running process , we have different sub
    commands or kill processes under the kill command


\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 08-47-38"}
    \caption{Showing processes that are runnning }
    \label{fig:screenshot-from-2024-10-25-08-47-38}
\end{figure}
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 08-47-58"}
    \caption{killing the bash with process id {7097}}
    \label{fig:screenshot-from-2024-10-25-08-47-58}
\end{figure}
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 08-48-08"}
    \caption{As you can see the process we just killed has been terminated}
    \label{fig:screenshot-from-2024-10-25-08-48-08}
\end{figure}

\section{5.1.1.1 Exercise}
\subsection{Question : }
The integer representation for the SIGTERM signal
\subsection{Answer : }
The integer representation for the SIGTERM is 15
\subsection{Question : }
The PID of your current active bash shell cess, we will use
using the ps command
\subsection{Answer : }
The integer representation for bash shell on my pc : 4482 , 4847 , 7116 , 7514
    \begin{figure}[H]
        \centering
        \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai
        ctures/Screenshots/Screenshot from 2024-10-25 09-03-53"}
        \caption{This show the current processes}
        \label{fig:screenshot-from-2024-10-25-09-03-53}
    \end{figure}
    \begin{figure}[H]
        \centering
        \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai
        ctures/Screenshots/Screenshot from 2024-10-25 09-06-33"}
        \caption{Killing the terminal process}
        \label{fig:screenshot-from-2024-10-25-09-06-33}
    \end{figure}
    \begin{figure}[H]
        \centering
        \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai
        ctures/Screenshots/Screenshot from 2024-10-25 09-07-00"}
        \caption{The process has been killed}
        \label{fig:screenshot-from-2024-10-25-09-07-00}
    \end{figure}
\section{Kill () command\\ C code)}
\begin{lstlisting}[language=C, caption={Mini-Shell using execvp}]
    #include<stdio.h>
    #include<sys/types.h>
    #include<signal.h>
    #include<unistd.h>
    int main()
    {
        printf("\nMuhammad Shafeen\n");
        printf("22P-9278\n");
        printf("BAI-5A\n");

        int x=10;
        int y=20;
        int sum=x+y;
        printf("Sum of %d and %d is : %d\n",x,y,sum);

        kill(getpid(),9);

        printf("The program has been killed\n");
        return 0;
    }
\end{lstlisting}
\subsection{Screenshots of C code}

\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 09-17-46"}
    \caption{The code for killing a process using C code}
    \label{fig:screenshot-from-2024-10-25-09-17-46}
\end{figure}
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 09-17-51"}
    \caption{Output of the code}
    \label{fig:screenshot-from-2024-10-25-09-17-51}
\end{figure}

\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 09-26-06"}
    \caption{The code to use 15 as kill }
    \label{fig:screenshot-from-2024-10-25-09-26-06}
```

```
\end{figure}
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 09-26-11"}
    \caption{Output of the code}
    \label{fig:screenshot-from-2024-10-25-09-26-11}
\end{figure}
\section{5.1.5.1 Exercise}
\subsection{Code using fork , Child signal-ing parent to kill}
I have used the execl command to show the processes
and then killed the process with SIGTERM and then display the processes after killing
\begin{lstlisting}[language=C, caption={Mini-Shell using execvp}]
#include<stdio.h>
#include<sys/types.h>
#include<signal.h>
#include<unistd.h>
#include<stdlib.h>
int main()
{
    printf("\nMuhammad Shafeen\n");
    printf("22P-9278\n");
    printf("BAI-5A\n");

    int x=10;
    int y=20;
    int sum=x+y;
    printf("Sum of %d and %d is : %d\n",x,y,sum);
    pid_t pid;
    pid=fork();
    if(pid==0)
    {
        pid_t pid2;
        pid2=fork();
        if(pid2==0)
        {
            printf("Showing processess before killing it\n");
            execl("/bin/ps","ps -au",(char *)NULL);
            perror("execl failed");
        }
        // sleep(5);
    }
    else
    {
        kill(getppid(),15); //9
        printf("Showing processess after killing it\n");
        execl("/bin/ps","ps -au",(char *)NULL);
        perror("execl failed");
        exit(EXIT_FAILURE);
        return 0;
    }
}
\end{lstlisting}
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 10-00-02"}
    \caption{Code for kill() using fork()}
    \label{fig:screenshot-from-2024-10-25-10-00-02}
\end{figure}
```

```
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 10-00-08"}
    \caption{Output of the code for kill() and fork() )}
    \label{fig:screenshot-from-2024-10-25-10-00-08}
\end{figure}


\subsection{Code using fork , parent signal-ing child to kill}
I have used the execl command to show the processes
and then killed the process with SIGTERM and then display the processes after killing
\begin{lstlisting}[language=C, caption={Mini-Shell using execvp}]
#include<stdio.h>
#include<sys/types.h>
#include<signal.h>
#include<unistd.h>
#include<stdlib.h>
int main()
{
    printf("\nMuhammad Shafeen\n");
    printf("22P-9278\n");
    printf("BAI-5A\n");

    int x=10;
    int y=20;
    int sum=x+y;
    printf("Sum of %d and %d is : %d\n",x,y,sum);
    pid_t pid;
    pid=fork();
    if(pid==0)
    {
        sleep(1);
        pid_t pid2;
        pid2=fork();
        if(pid2==0)
        {
            printf("Showing processess before killing it\n");
            execl("/bin/ps","ps -au",(char *)NULL);
            perror("execl failed");
        }
        kill(getpid(),15); //9
        // sleep(5);
    }
    else
    {
        sleep(2);
        printf("Showing processess after killing it\n");
        execl("/bin/ps","ps -au",(char *)NULL);
        perror("execl failed");
        exit(EXIT_FAILURE);
        return 0;
    }
}

\end{lstlisting}
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 10-08-12"}
    \caption{}
    \label{fig:screenshot-from-2024-10-25-10-08-12}
\end{figure}
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 10-08-18"}
    \caption{}
    \label{fig:screenshot-from-2024-10-25-10-08-18}
\end{figure}
\section{Signal Handling Exercise}
\begin{lstlisting}[language=C, caption={Mini-Shell using execvp}]
#include <signal.h>
#include <stdio.h>
#include <unistd.h>
int sigCounter = 0;
void sigHandler(int sigNum)
{
    printf("Signal received is %d\n", sigNum);
    ++sigCounter;
    printf("Signals received %d\n", sigCounter); }
int main()
{
    signal(SIGINT, sigHandler);
    while(1)
    {
        printf("Hello Dears\n");
        sleep(1);
    }
    return 0;
}

\end{lstlisting}
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 10-13-03"}
    \caption{The code for infinite loop}
    \label{fig:screenshot-from-2024-10-25-10-13-03}
\end{figure}
\begin{figure}[H]
    \centering
    \includegraphics[width=0.7\textwidth]{"../../../../../../home/shafeenyousafzai/Pic
    es/Screenshots/Screenshot from 2024-10-25 10-23-40"}
    \caption{Execution of infinite loop}
    \label{fig:screenshot-from-2024-10-25-10-23-40}
\end{figure}


\end{document}
```