Question 1

The makefile compiles all the three files for the three questions and creates the executables.
Make clean deletes all the executables.

The code for part 1 works as follows:
Using the getpid() function we get the pid of the process that is currently executing which after forking becomes our parent process.After the fork() call, both the parent and child processes execute independently with identical copies of the program.Using wait we make the parent program wait for the child process to execute completely

The code for part 2 works as follows:
First we create functions to calculate the fibonacci series and the factorial of a number.
Then in the main function we first get the pid of the parent, then using vfork we create the child process.
The vfork process creates a new child process correctly when it returns 0.Once the child process in made, it runs.Then before the parent process is continued we put wait(Null) so that the parent process waits till the child process is executed

The code for bonus works as follows:
It is similar to part B here, just we make the child process wait using wait(NULL) so that the parent gets executed before the child.

Question 2

To run the file open the directory and then put the following inputs in order
make clean
make
./shell
And then check for the 3 commands word,date,dir with the given syntax.

The two commands dir and date are implemented as external commands through execvp which calls bash commands(mkdir, rm and ls, date respectively) whereas the word command is implemented as a purely internal command which uses locally defined functions to run.

The shell runs in the form of a continuous while loop which runs until the input of exit is received inside this while loop string comparisons are made to verify which command is being run, then individual command parsing functions are run which return custom structs making it clear what the provided command needs to be done (which flags are provided what the arguments provided are if the syntax is appropriate etc) the program then has nested conditions to implement the different flag possibilities for execution and runs execvp or the internal function with the appropriate arguments.

Originally this program was implemented entirely externally(word as well) as can be observed from the commented sections wc and awk were used through bash scripts to implement the same.

Question 3

Firstly the script checks if there is the Result directory in the current directory and if not there it makes one.
Then the output file is cleared.Then a loop is run to read the input file which is read line by line.Then the operation is compared from the input and if conditions are used.The result is stored in a variable and the output is printed in output.txt file in the result directory.