Student Name	
Student ID	

Question 1: Provide a short definition for each of the following terms. Keep your answer within the space provided in the table. [14 points, 2 points for each definition]

TERMS	ANSWER
Kernel	Manages processes, task switching, login, RAM allocation
File System	Secondary storage (HDD, CD, DVD, USB, etc), Disk format, FAT
Shell	UI, command-line, shell-memory, interpreter
Utilities	Collection of OS programs on secondary storage (includes 3rd party), drivers
Shell Memory	Environment variables, user variables, global session memory, in RAM
Command-line	A text-based UI where user inputs command words, sends to shell interpreter for processing, provides inter-process communication
Bash	A particular shell with a popular shell-language. Found on Unix-based system.

Question 2: What does this C program print out? Be exact. [15 points]

```
#include<stdio.h>

int main()  {
    char line[150];
    int i, j;

    printf("Enter a string: ");
    gets(line); // assume user inputs: p2'r-o@gr_am84iz./

    for(i = 0; line[i] != '\0'; ++i)  {
        while (!( (line[i] >= 'a' && line[i] <= 'z') || (line[i] >= 'A' &&
            line[i] <= 'Z') || line[i] == '\0') )
        {
            for(j = i; line[j] != '\0'; ++j)  {
                line[j] = line[j+1];
            }
            line[j] = '\0';
        }
    }                                   Removes all non-alphabetic characters
                                        from the input string.
    printf("Output String: %s\n", line);

    return 0;
}
```

Question 3: Write a Bash program that has a main program and a function. The function is called factorial. It accepts a single integer number and returns the factorial of that number. The function uses a loop to calculate the factorial. For example, if the argument passed to the function is the integer 4, then the factorial of 4 is 4*3*2*1 which equals 24. The function returns the number 24. Another example, if the argument is 3 then the factorial is 3*2*1 which equals 6. The main program accepts any number of integers from the command-line. It displays on the screen each number and its factorial. For example the command-line invocation would look like: ./factorial 3 4 5 The program would output 3=6, 4=24, 5=120. The user can enter as many numbers as they want at the command-line. [21 points]

```
#!/bin/bash

result=0

function factorial
{
        result=1
        limit=$1

        while [ $limit -ne 0 ]
        do
                result=$(($result * $limit))
                limit=$(($limit - 1))
        done
}

for x in "$@"
do
  factorial $x
  echo $result
done
```