

**A. Questions**

1) Declare the following:

- a) An unnamed enumerated type with constants `low`, `medium`, and `high` having values 0, 1, and 2, respectively.
- b) An enumerated type named `difficulty` with constants `low`, `medium`, and `high` having values 0, 1, and 2, respectively.
- c) An enumerated type named `fruit` with constants `apple`, `banana`, and `orange` having values 0, 4, and 5, respectively.
- d) A variable named `myfruit` with the type declared in c).
- e) An union named `aunion` with the following members: character `c`, integer `i`, and double-precision floating point `d`.
- f) A variable named `myunion` with the type declared in e).
- g) An unnamed union with the following members: character `c`, integer `i`, and double-precision floating point `d`, and at the same time a variable `u1` of the unnamed union type.

Answers:

```
a) enum {low, medium, high};
b) enum difficulty {low, medium, high};
c) enum fruit {apple, banana=4, orange};
d) enum fruit myfruit;
e) union aunion { char c; int i; double d };
f) union aunion myunion;
g) union { char c; int i; double d } u1;
```

2) Consider the following C code snippet:

```
enum { mercury, venus=3, earth, mars } p1 = mars;
```

- a) What is the value of `mercury`?
- b) What is the value of `earth`?
- c) What is the value of `p1`?

Answers:

- a) 0
- b) 4
- c) 5

3) Consider the following C code snippet:

```
1 union ut {
2     int i;
3     double d;
4 } u1;
5
6 u1.i = 10;
7 u1.d = 2.5;
```

- What is the size of the variable `u1`?
- What is the active member at line 6?
- What is the active member at line 7?
- Is the value of the member `i` valid after line 7?
- Is the value of the member `d` valid after line 7?

Answers:

- `sizeof(double)`
- The member `i`
- The member `d`
- It is invalid because it is overwritten by the assignment to member `d`.
- It is valid

4) Determine whether the following statements are True or False:

- One advantage of file stream over file descriptor is that the former allows content to be formatted using format specifiers.
- To be able to read keyboard input, a program must first open the `stdin` stream.
- When a file is opened with mode “a”, the contents of the file (if it exists) will be deleted.
- The function `fflush()` only works on streams that are open for output.
- The function `fscanf()` will return EOF if the end of file is reached, or errors were encountered while reading the file.
- When a binary file is opened with mode “rb”, the file must exist, otherwise, `fopen()` will return NULL.
- The call `rewind(fp)` is equivalent to the call `fseek(fp, -s, SEEK_END)`, where `s` is the size of the file (in bytes).

Answers:

- True
- False
- False
- True
- True
- True
- True

5) Consider the following C snippet:

```
1  int i;
2  FILE *fp = fopen("input.txt", 'r');
3  fscanf(fp, "%d", &i);
4  /* Done reading from the file */
5  printf("%d", i);
```

Describe 4 issues (error and poor programming) with the code.

Answers:

- 1) In line 2, the mode argument should be a string, 'r' should be replaced by "r".
- 2) After the call to `fopen()`, its return value must be checked to ensure that the file opening was successful.
- 3) After the call to `fscanf()`, its return value must be checked to ensure that the reading was successful.
- 4) After line 3, the file must be closed using `fclose()`.

6) Write a C program that will open a text file named `input.txt` for reading. The program will then convert all content to their lowercase equivalent, and output these to another text file named `output.txt`.

```
#include <stdio.h>
#include <ctype.h>

int main(void)
{
    int c;
    FILE *in = fopen("input.txt", "r");
    if(in == NULL) {
        printf("Failed to open input.txt\n");
        return 0;
    }
    FILE *out = fopen("output.txt", "w");
    if(out == NULL) {
        printf("Failed to open output.txt\n");
        return 0;
    }
    while( (c=fgetc(in)) != EOF )
        fputc(tolower(c), out);
    fclose(in);
    fclose(out);
    return 0;
}
```