

CS201 Programs

Create a subdirectory of your home directory named `apr15`, and place your solutions there. Name your solutions `p1.c`, `p2.c`, and `p3.c`. Your programs should produce no output (to `stdout`) other than the output asked for in the problem. Any debugging output should be written to `stderr`.

1. Write a C program that reads text from `stdin` and counts the number of letters (upper case or lower case) and the number of characters that are not letters. The output of the program should consist of two integers on one line separated by a space: first the number of letters, then the number of non-letters. Note: the sum of the two counts should be the size of the file.

2. Write a C program that opens a text file named as a command line argument, sorts the lines in decreasing order of length (longest first), then prints the sorted lines to `stdout`. Write three functions:

1. `int readfile(FILE *fd, char *lines[])`;: a function which reads lines from `fd` and stores them in `lines`.
2. `int sortlines(int nlines, char *lines[])`;: a function which sorts the lines according to their length (longest first).
3. `void printlines(FILE *fd, char *lines[], int nlines)`;: a function which prints lines; `nlines` is the number of lines to print.

Your main program should look something like this:

```
int main(int argc, char *argv[]){
{
    char *lines[MAXLINES];
    int nlines;
    FILE *fd;

    /* you should add error checking for a command line argument */

    fd = fopen(argv[1], "r");

    /* you should add error checking for failure to open the file */

    nlines = readlines(fd, lines);
    sortlines(lines, nlines);
    printlines(stdout, lines, nlines);
}
```

3. Write a C program that takes a decimal (base 10) integer as a command line argument, reverses the bits in the binary representation of the integer, then prints the reversed value in decimal. For example, if the command line argument is 39, then the binary representation is 100111, which is 111001 reversed. In decimal, 111001 is 57, so 57 should be the output.