

UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE AND ENGINEERING
FINAL EXAMINATION, APRIL 2001
First Year
APS106S - FUNDAMENTALS OF COMPUTING

Exam Type: A (Closed book, no exam aids)
No calculators.

Examiners – M.W. Grabinsky and E.C. Bentz

Examination is marked out of 100. The partial value of each question is indicated in the margin.

Last Name: _____

First Name(s): _____

Student Number: _____

Question	Value	Obtained
1	20	
2	20	
3	20	
4	20	
5	20	
Total:	100	

Note: all work is to be done on this examination paper. If you require extra space, you may use the backs of the pages – however, be sure to indicate on the primary question page where your work is continued.

In all of your program solutions in this examination, perform appropriate error checking as described in class and textbook examples. Do not use global variables.

Q 1: Provide short answers to each of the following (2 marks each for total of 20 marks)

- a) Convert the following C code to a single cell definition in Excel:
if (c4==4 && c5==6) printf("1"); else printf("0");
- b) Provide the cell equation and any special steps to solve for X in the matrix equation $[K][X] = [A]$ if K, X, and A are all named arrays.
- c) What are the main differences between goal seek and the solver in Excel?
- d) What are the difference between a compiler, a linker and a preprocessor?
- e) What is the maximum value that can be stored into an unsigned 12 bit integer?
- f) List 6 different variable types as used in C.
- g) Write a printf() statement to print out variables x and y (int x=34, float y =100) as "Student number 34 got 100.0 % on the final" (you don't need to print the quotes)
- h) What does the fflush() command do and why is it used?
- i) Explain what's happening to variable 'a' in each line of the following code fragment: (4 marks)

```
int *a, b=10;  
a = &b;  
*a *= 2;  
printf(" value is %d\n", *a);
```

Q 2: Translate the following pseudocode into a working C program. (20 marks)

Print "Enter the name of input file" to screen

Read the file name from the user

Try to open the file

If the file cannot be opened, print "Cannot
open file name (insert file name) - try again"

Print "file opened"

Read a sentence from the file

Print "the sentence from the
file is (insert sentence here)"

Call a function called `sdrawcab` that will
print the sentence out backwards, letter-by-letter.

Function should do the following:
Determine length of string and
store it in variable `L`.

Print "the sentence in reverse is: "

Start with character `L` and work backwards
to start printing out each letter at a time.

End.

Q 3: Write a full C program that reads a file called "input.txt" for a list of high-precision floating point numbers. The first line in the file contains the number of lines in the file after the first line. The program should read each line and store it into an array that is dynamically allocated to be the exact size necessary. After loading the numbers, calculate the average and print that out to the screen to 6 decimal places. (20 marks)
(of course, $\text{Average} = \text{sum}(\text{numbers}) / \text{count}(\text{numbers})$).

Q 4: Write three C code fragments that prints out all the numbers in an array called Arr. Assume that Arr is defined as "float Arr[34]" and that it has been fully initialized. Include any variable declarations that you need just before the loops that you write. You must write **3 different** code fragments that all do the identical thing, once with a for loop, once with a while loop, and finally using a do-while loop. (note that as a code *fragment*, you don't need to declare or initialize Arr[], or provide include statements, just the code that prints it out.)

(20 marks)

Q5: The following program has at least 10 mistakes in it. Find 10 serious errors and provide corrections for the errors. (circle the error and provide a number for it.) (20 marks)

```
#include <studio.h>

#define MAXIMUM = 12;

int main(void) {

    int a,*b
    do {
        printf("Enter the hour of arrival  ");
        scanf("%d",a);
    } while (a <= 0 && a >= MAXIMUM);

    *b = a;
    printf("The day starts at %d",*b);

    while (a>0); {

        if (a = 0)
            printf("the sun hasn't risen\n");
        else
            printf("The sun also rises on the mountain at %p\n",a);

        /* don't worry if the math makes any sense here.. it doesn't! */
        printf("Angle of sun at rise %5.3f\n",sin(1.0*a*360/24));

        a++;
    }
}
```

Error	Changes to make it work properly:
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