

CS3157 – Advanced Programming
Sample Final Examination

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1. (10 pts) Please define in as few sentences as you can. Where ever possible please support your answers with an example if appropriate.

a. operator overloading

b. enum

c. malloc

d. pass by reference

e. gdb

2. (16 pts) Given the program:

```
main()
{
    const int a = 1;
    int b = 2;
    const int *p = &x;
    int * const q = &b;
    int & r = b;
```

// Which of the following statements are legal or not ?
// Explain.

- a. `p = &q;` // (a)
 - b. `*p = 55;` // (b)
 - c. `q = &a;` // (c)
 - d. `q = 55;` // (d)
 - e. `q = p;` // (e)
 - f. `*q = *p;` // (f)
 - g. `*q = a;` // (g)
 - h. `r = a;` // (h)
- ```
}
```

3. (14 pts) What do the following Perl statements do?

a. `substr $seq, 25, 320;`

b. `$sdfd{'hhh'}`

c. `print "\n"`

d. `next`

e. `foreach $xyz (@abc)`

f. `1 .. 5`

g. `s/abc/xyz/`

h. `pos`

i. `push`

j. `=~`

k. `system`

4. (8 pts)
- a. (2 pt) Suppose A is a 2-dimensional array of integers with 3 rows and 4 columns. How do you define this variable A in C++ ? How would you define it and at the same time initialize it to all zero entries ?
  
  - b. (1 pts) How would you define it and at the same time initialize it to all entries having the value 2 ?
  
  - c. (.5 pts) Write a segment of C++ code that would retrieve the value of A that is stored in row 2, column 3, and print it to the screen.
  
  - d. (.5 pts) Write a segment of C++ code that would store the value -10 in the entry in row 3, column 2.
  
  - e. (4 pts) Write a function that takes a 2-D array with 4 rows and 4 columns as input, and delivers a single number as output. The output should be the sum of the diagonal, or the sum of all entries in the table depending on an argument passed in to the method.

5. (10 pts) Write a complete C++ program that reads characters one at a time until end of file. After it reaches end of file, it prints the number of times it saw each of your initials in either upper or lower case. Group together the counts of upper and lower case letters for each initial. If you have only two distinct initials (as in mine are SH), you have only two counts being printed. Use your initials; they are not read from the command prompt.

6. Write a shell script which opens all files in the local directory containing the letter G in their filenames and prints out a total number of characters for each file and a grand total at the end for all files seen.

7. Extra Credit:

a. What is Xvfb (we used it in webthumb).

b. describe grep