

COMP2303/7306 2011
Mid-semester exam
Open Book, no communication devices, approved calculators only
Time allowed: 35 minutes
Reading time: 5 minutes

Name: _____

Student number:

Instructions:

- In all questions circle the most correct answer.
- In questions where knowledge of the computer's hardware is required, assume the following:
 - A 32bit address space.
 - 4KB pages with 4 byte page table entries.
 - Uses two level page tables.
 - L1 and L2 cache are considered part of memory.

1) Which lines in the following would cause warnings/errors under
`gcc -c -ansi -pedantic -Wall?`

```
int f(char c) { [1]
    if ((c<'a') || (c>'z')){ [2]
        return; [3]
    } [4]
    char i; [5]
    for (i=c;i<='z';++i){ [6]
        printf("%c"); // print remaining [7]
    } [8]
    return 1; [9]
}
```

- | | | |
|-------|-------------|-----------------------|
| (a) 1 | (g) 9 | (m) 2, 6, 9 |
| (b) 2 | (h) 3, 5 | (n) 3, 5, 9 |
| (c) 3 | (i) 6, 7 | (o) 1, 2, 3, 5 |
| (d) 5 | (j) 3, 5, 7 | (p) none of the above |
| (e) 6 | (k) 2, 3, 5 | |
| (f) 7 | (l) 2, 5, 7 | |

2) Which of the following `svn` commands do not require a commit?

- (a) add
 - (b) remove
 - (c) status
 - (d) update
 - (e) diff
 - (f) add, diff
 - (g) update, remove
 - (h) status, diff, update
 - (i) add, remove, update, diff, status
 - (j) We can't be certain/none of the above.
-

3) Consider the following program:

```
#include <stdio.h>
int main(int argc, char** argv) {
    int i;
    for (i=0;i<3;++i) {
        fprintf(stderr, "%d is ",i);
        if (i%2) {
            fprintf(stderr, "even\n");
        } else {
            fprintf(stderr, "odd\n");
        }
    }
    return 0;
}
```

The program is compiled and run with the following command:

```
./a.out | grep -v even
```

Which lines will appear on the console?

- (a) nothing will appear
- (b) 0 is even
1 is odd
2 is even
- (c) 0 is even
2 is even
- (d) 1 is odd
- (e) The shell command is invalid
- (f) none of the above.

4) We wish to find the 7th line in a file called `data` which contains the word “fish”. Which of the following lines would do this?

- (a) `grep data fish | head -7 | tail -1`
- (b) `grep fish data | tail -7 | head -1`
- (c) `cat data | head -7 | tail -1 | grep fish`
- (d) `cat data | grep fish | head -7 | tail -1`
- (e) `grep fish | head -7 | tail -1`
- (f) `head -7 | cat data | tail -1 | grep fish`
- (g) none of the above.

5) After executing the following code fragment what are the values of w , x , y , z .

```
int w=0;
int x=6;
int y=3;
int z=2;
if (x==y==z){
    z=4;
} else {
    z=9;
}
if (w);{
    w=7;
}
```

- (a) $w=7$; $x=0$; $y=2$; $z=4$;
- (b) $w=0$; $x=6$; $y=2$; $z=4$;
- (c) $w=7$; $x=0$; $y=3$; $z=9$;
- (d) $w=0$; $x=0$; $y=3$; $z=4$;
- (e) $w=7$; $x=6$; $y=2$; $z=9$;
- (f) It is not legal C.
- (g) Segmentation fault.
- (h) We can't be certain/none of the above.

6) What are the values of i and j after executing the following code.

```
int i=4;
int j=2;
switch (i++-j) {
    case 3:i++; break;
    case 1:j++; break;
    case 2:j+=2;
    case 5:i+=2;
    default:i+=5;
}
```

- (a) $i=5; j=2;$
- (b) $i=6; j=2;$
- (c) $i=7; j=4$
- (d) $i=9; j=2;$
- (e) $i=11; j=2;$
- (f) $i=12; j=4;$
- (g) It is not legal C.
- (h) Segmentation fault.
- (i) We can't be certain/none of the above.

7) What type are `var`, `foo`, `baz` in the following?

```
long* var, foo[7], baz;
```

- (a) `var` - pointer to long, `foo` - array of 7 pointers to long, `baz` - pointer to long
- (b) `var` - pointer to long, `foo` - array of 7 longs, `baz` - long
- (c) `var` - long, `foo` - array of 7 pointers to long, `baz` - long
- (d) `var` - pointer to long, `foo` - array of 7 longs, `baz` - pointer to long
- (e) `var` - long, `foo` - array of 7 longs, `baz` - long
- (f) It is not legal C.
- (g) We can't be certain/none of the above.

8) Which of the following declares `foo` to be:
a function which returns a string and takes a pointer to a function which takes a char and returns a char.

- (a) `char* (*foo)(char (*)(char))`
- (b) `char *foo(char*)(char)`
- (c) `char (*foo)((*)()`
- (d) `char* (*foo)(char (*)(char))`
- (e) It is not possible to write such a declaration.
- (f) We can't be certain/none of the above.

9) What is the result of the following code?

```
int x=2, y=3, z=5;
int* py=&x;
int* px=&y;
*px=x+y;
z=*px;
x=*px-*py;
*px=y-*py;
```

- (a) `x=0, y=3, z=5`
- (b) `x=2, y=3, z=5`
- (c) `x=3, y=2, z=5`
- (d) `x=2, y=3, z=2`
- (e) `x=2, y=3, z=3`
- (f) It is not legal C.
- (g) Segmentation fault;
- (h) We can't be certain/none of the above.

10) What is the result of the following code?

```
int x=0, y=2, z=4;
int *px, *py, *pz;
py=&z;
pz=&y;
x=x+4;
*px+=4;
```

- (a) x=0, y=2, z=4
 - (b) x=4, y=2, z=4
 - (c) x=8, y=2, z=4
 - (d) x=4, y=4, z=4
 - (e) It is not legal C.
 - (f) Segmentation fault;
 - (g) We can't be certain/none of the above.
-

11) Consider the following function:

```
void f(int x) {
    x--;
    fprintf(stderr, "B");
    if (fork()) {
        fprintf(stderr, "C");
        if (x>1) {
            f(x);
        }
    } else {
        fprintf(stderr, "A");
    }
    fprintf(stderr, "B");
}
```

When f(3) is called, how many B's will be output?

- (a) 2
- (b) 3
- (c) 4
- (d) 5
- (e) 6
- (f) 7
- (g) 8
- (h) 9
- (i) none of the above.

12) When is a zombie process **not** created?

- (a) When a segmentation fault occurs.
- (b) When `_exit()` is called.
- (c) When the `main()` function returns.
- (d) When its parent was `wait()`ing for it.
- (e) none of the above.

13) The CPU access the following (base 10) virtual addresses in sequence.

45055, 45056, 8392710, 45090, 8392714, 45091

How many accesses to memory are required?

- (a) 4
- (b) 5
- (c) 6
- (d) 9
- (e) 10
- (f) 11
- (g) 12
- (h) 15
- (i) 16
- (j) none of the above.

14) What is the largest amount of memory the page table for a single process can occupy?

- (a) 3072KB
- (b) 4096KB.
- (c) 4100KB.
- (d) 1048576KB.
- (e) 4GB.
- (f) none of the above.

15) Given the following page table, map the (base 10) virtual addresses to physical addresses.

0	200
1	201
2	22
3	invalid
...	invalid
25	24
...	invalid

Addresses: 500, 8200, 102400

- (a) 500, 8200, 102400
- (b) 819700, 90120, 98304
- (c) 823796, 90120, 102400
- (d) 819700, 823304, 102400
- (e) 823796, 823304, 98304
- (f) A page fault will occur
- (g) A segmentation fault will occur
- (h) none of the above