

Problem Set 5

CS 411

Due at the beginning of class on the first class day of the following week.
Sections 3.4–8

1. What is the output of the following program? Explain your answer.

```
#include <sys/types.h>
#include <stdio.h>
#include <unistd.h>

int value = 5;

int main()
{
    pid_t pid;

    pid = fork();

    if (pid == 0)
    {
        value = 15;
        printf("Value = %d.\n", value);
    }
    else if (pid > 0)
    {
        wait(NULL);
        printf("Value = %d.\n", value);
    }

    return 0;
}
```

If the `wait()` system call is removed from the previous program, what will the modified program's output be? Again, explain your answer.

2. Including the initial parent process, how many processes are created by this program? Explain your answer.

```
#include <stdio.h>
#include <unistd.h>
int main()
{
    int i;

    for (i = 0; i < 4; i++)
        fork();

    return 0;
}
```

3. What are the benefits and the disadvantages of each of the following? Consider both the system level and the programmer level.
- (a) Synchronous and asynchronous communication
 - (b) Automatic and explicit buffering
 - (c) Send by copy and send by reference
 - (d) fixed-size and variable-sized messages