IC221 System Programming
Spring 2016 NAME:_____
HW11

COLLABORATOR(S):_____

5/3/1/0 1. What is a signal and why are they asynchronous?

5/3/1/0 2. Match the terminal signal to the keyboard-shortcut/command:

Ctrl-c ____		(a) **SIGSTOP**
Ctrl-Z ____		(b) **SIGCONT**
		(c) **SIGINT**
fg/bg ____		(d) **SIGTERM**
Ctrl-\ ____		(e) **SIGQUIT**

5/3/1/0 3. Run the command **kill -l** to list all the signals and their numbers. Find the signal-value/signal-name to complete the table below:

Signal Name	Value
SIGKILL	9
	14
SIGALRM	
SIGABRT	
	21
	1

5/3/1/0 4. What is the difference between the shell command **kill** and **killall?**

5/3/1/0 5. What does the following command do with respect to signaling and the expected result?

killall -17 sleep

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6. On a lab machine, run the following program in the background:

~aviv/bin/ic221-signaler &

From the same (or another) terminal on the **same** machine, send the program either a SIGUSR1 and a SIGUSR2 signal. Describe the result below:

5/3/1/0 SIGUSR1

5/3/1/0 SIGUSR2

7. For the program below, answer the following questions: int

5/3/1/0 a) What is the output of running the program after entering **one** Ctrl-C?

5/3/1/0 b) What is the output of running the program after entering **four** Ctrl-C?

5/3/1/0 c) What is the output of running the program after entering **three** Ctrl-C and **one** Ctrl-Z?

```
count = 0;
void handler(int signum){
    printf("You Shot Me!\n");
    count++;
    if(count > 3){
        printf("I'm dead!\n");
        _exit(1);
    }
}

int main(){
    //set up handler
    //for SIGINT and SIGSTOP
    signal(SIGINT,handler);
    signal(SIGSTP,handler);

    //loop forever
    while(1);
}
```

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5/3/1/0 8. What does the system call **pause()** do? Explain what the difference between the code snippets:

while(1); and **while(1) pause();**

5/3/1/0 9. The **alarm()** system call schedules which signal to occur after the specified time? How do you reset an alarm?

5/3/1/0 10. How many times does the program below print alarm?

```
int count = 10;
void handler(int sugnum){
     printf("Alarm!\n");
     count /= 2;
     alarm(count);
}

int main(){
     signal(SIGALRM, handler);
     alarm(count);
     while(1) pause();
}
```

5/3/1/0 11. For the following program, how long does it take for the signal to be delivered? What happens after it is delivered?

```
int main(){
     alarm(1);
     alarm(2);
     alarm(3);
     alarm(1);

     pause();
}
```

5/3/1/0 12. Convert the use of **signal()** to a use of **sigation()** by filling in the sigaction struct:

```
signal(SIGUSR1, handler);
```

```
struct sigaction action;
```

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5/3/1/0 13. Use **man errno** to lookup the description of the **EINTR** error number. Describe it below, and when would such an error occur?

5/3/1/0 14. What **sigaction** flag is used to ensure that system calls will be restarted when interupted?

5/3/1/0 15. Use **man 7 signal** to answer the following questions about the default actions for certain system calls:

Signal Name	Default Action
SIGKILL	
SIGTTIN	
SIGALRM	
SIGABRT	
SIGTOU	
SIGCHLD	

5/3/1/0 16. According to **man 7 signal** which system call is **re-entrant** and which is not? **read(), wait(), recv(), pause().** For the one that is not, why should it not be re-entrent?

5/3/1/0 17. Look in **man 7 signal** and **kill -l** and draw a picture of your favoirte signal, be sure to identify it.

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