CSCI 2330 – Signal Exercises

1. Consider the following C code:

```
void sig_handler(int signo) {
    if (signo == SIGINT) {
        printf("SIGINT\n");
    } else if (signo == SIGTERM) {
        printf("SIGTERM\n");
    } else if (signo == SIGTSTP) {
        printf("SIGTSTP\n");
    } else if (signo == SIGSEGV) {
        printf("SIGSEGV\n");
    }
}

int main(void) {
    signal(SIGINT, sig_handler);
    signal(SIGTERM, sig_handler);
    signal(SIGTSTP, sig_handler);
    signal(SIGSEGV, sig_handler);
    while (1) {}
    return 0;
}
```

This program is running as a process with PID 123. Identify every possible sequence of output under the following scenarios:

a. A user presses Ctrl+C
b. kill -TERM 123; kill -TERM 123; kill -TERM 123
c. kill -TERM 123; kill -INT 123

2. Consider the following C code:

```
int main(void) {
    if (fork() == 0) {
        sleep(5);
        _exit(0);
    }
    sleep(10);
    waitpid(-1, NULL, 0);
    return 1;
}
```

Draw the process tree (a) immediately after **sleep(5)** returns, (b) immediately after **sleep(10)** returns, and (c) immediately after **waitpid()** returns. In each case, indicate which processes are zombies, if there are any.

3. Consider the following C code:

```
void sigchld_handler(int signo) {
    printf("SIGCHLD\n");
    waitpid(-1, NULL, 0);
}

int main(void) {
    signal(SIGCHLD, sigchld_handler);
    if (fork() == 0) {
        sleep(5);
        _exit(0);
    }
    if (fork() == 0) {
        sleep(5);
        _exit(0);
    }
    if (fork() == 0) {
        sleep(5);
        _exit(0);
    }
    while (1) {}
    return 0;
}
```

Identify every possible sequence of output after running this program for a minute. For each possible sequence of output, draw the corresponding process tree after running this program for a minute. In each case, indicate which processes are zombies, if there are any.