

Homework 10

Problem 1

A. The program in the figure below has a bug. The thread is supposed to sleep for 1 second and then print a string. However, when we run it on our system, nothing prints. Why?

B. You can fix this bug by replacing the exit function in line 9 with a Pthread function calls. What's it?

```
1  #include "csapp.h"
2  void *thread(void *vargp);
3
4  int main()
5  {
6      pthread_t tid;
7
8      Pthread_create(&tid, NULL, thread, NULL);
9      exit(0);
10 }
11
12 /* Thread routine */
13 void *thread(void *vargp)
14 {
15     Sleep(1);
16     printf("Hello, world!\n");
17     return NULL;
18 }
```

Problem 2

Using the progress graph in Figure 12.21, classify the following trajectories as either

safe or unsafe. And draw them out.

A. H2, L2, U2, H1, L1, S2, U1, S1, T1, T2

B. H2, H1, L1, U1, S1, L2, T1, U2, S2, T2

C. H1, L1, H2, L2, U2, S2, U1, S1, T1, T2

Problem 3

1. Starvation (in relation to threads) refers to:
 - (a) A thread waiting for a lock indefinitely.
 - (b) A semaphore that gets locked but the thread never unlocks it after use.
 - (c) A thread is spawned but never joins the main thread when finished.
 - (d) A process fails to spawn a new thread because it's hit the maximum number of threads allowed.

Problem 4

Can the following program deadlock? Why or why not?

Initially: a=1, b=1, c=1.

Thread 1: Thread 2:

P(a); P(c);

P(b); P(b);

V(b); V(b);

P(c); V(c);

V(c);

V(a);

Problem 5

What are the advantages of using virtual memory instead of physical memory?