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Homework #3

1. The algorithm would favor I/O bound processes since I/O communication are time-intensive so the calling process would require more time to complete. CPU bound processes will use as much time as is allocated to the process.

2.

Line #	*Value of x*	*Value of y*
1	11	2
2	11	2
3	11	9
1	12	9
2	12	9
3	12	10
4	12	10
5	11	10
4	11	10
5	10	10
4	10	10
6	10	10
4	10	10
6	10	10
1	11	10
7	10	10
3	10	8
1	11	8
7	10	8
3	10	8

3.

```
monitor b_stack {
      int max;
      int size;
      value stack[max];
      condition c;

      void push(value x) {
            if(size >= max)
                  return(ERROR);
```

```
            stack[(size++)-1];
            c.signal;
      }

      value pop() {
            if(size <= 0)
                  c.wait;

            return(stack[size--]);
      }
}
```

4.

```
#include “The Monitor from Problem #3”

int N = 10; // Number of seats in shop
int T = 100; // Time units between customers
b_queue the_shop(N);

int main() {
      int barber,customers;

      pthread_create(&barber,NULL,barber,NULL);
      pthread_create(&customers,NULL,customers,NULL);

      return(0);
}

void barber(void* ptr) {

      while(END_CONDITION) {
            customer next_customer = the_shop.pop();

            process(next_customer);
      }

      pthread_exit(NULL);
}

void customers(void* ptr) {

      while(END_CONDITION) {
            wait(RANDOM_TIME(0,T));

            the_shop.push(new_customer());
      }

      pthread_exit(NULL);
}
```

5. Yes. If the process request a resource which will never become available, then it will enter a deadlock state.

6.a. P4, P3, P1, P2
6.b. P3,P4
6.c. No
6.d. No

7. This question is unanswerable because of an ambiguous statement in the question problem, “Resources can be requested and released by processes only one at a time.” There are few different way to interpret this, such as “Well can there only be one process requesting resources?” or “Can the process only request one resource at a time?” Do to this ambiguity, the question is unanswerable.

8.