

Name: _____ (First name first)

Score: _____

Closed book. You can have with you one single-sided 8½ by 11 sheet of notes.

1. What distinguishes Core processes from both regular kernel supported threads and conventional Unix processes? (20 easy points)

A Core process can specify which parts of its address space are shared among sibling processes and which parts are not.

2. What are the respective major disadvantages of:

- a) **Spin:** (10 points for one disadvantage)

Spin requires rewriting the essential parts of the kernel in a type-safe language.

- b) **PCC:** (10 points for one disadvantage)

Writing proofs of non-trivial pieces of code remains a very difficult task.

- c) **Nooks:** (20 points for two disadvantages)

Nooks has a much higher overhead than both Spin and PCC.

Nooks does not protect the kernel against rogue extensions.

3. A system of physical clocks consists of two clocks, namely, one that is slow and loses 10 minutes every hour and another that is neither fast nor slow. Assuming that the clocks are managed by Lamport's physical clock protocol, what will be the time marked by each clock at three o' clock given that

- a) Both clocks indicated the correct time at noon;
- b) The processors on which the clock reside continuously exchanged messages between themselves until two o'clock then ceased to communicate; and
- c) Message transmission delays are negligible.

The slow clock will indicate 2:50 pm plus or minus a few seconds at three o' clock. (10 points)

The other clock will indicate 3:00 pm plus or minus a few seconds at three o' clock. (10 points)

Explanation: Both clocks indicated the correct time until two o'clock.

4. Consider a cache managed by an ARC policy. Which page faults will result in

- a) An increase of **target_T1**: (10 points)

When the page that was missing was mentioned in the B1 list.

- b) An decrease of **target_T1**: (10 points)

When the page that was missing was mentioned in the B2 list.