**NAME**: Shaydon Bodemar

Rename the completed Word document to *yourlastname\_Q1.docx* before emailing it to [tlupfer@sandiego.edu](mailto:tlupfer@sandiego.edu). In other words, my quiz would be named *lupfer\_Q1.docx*.

This is a closed-book, off-grid (no Internet searches) quiz. You have 20 minutes to complete it.

**Reminder**: USD Honor Code: [www.sandiego.edu/conduct/documents/HonorCode.pdf](http://www.sandiego.edu/conduct/documents/HonorCode.pdf)

**All questions are worth 5 points (21 x 5 = 105 points total)**

What does it mean when we say an operating system is deterministic?

1. **Answer**: Input from peripherals has a fixed maximum response time

What is an example of the behavior of a non-deterministic operating system?

1. **Answer**: A USB keyboard’s input not appearing on screen for a couple seconds

What is latency?

1. **Answer**: Time between peripheral input and software reaction

Is an RTOS deterministic or non-deterministic?

1. **Answer**: Deterministic

What are the three general characteristics of a traditional operating system?

1. **Answer**: Large
2. **Answer**: Monolithic
3. **Answer**: Non-deterministic

What are the three general characteristics of an RTOS?

1. **Answer**: Compact
2. **Answer**: Fixed peripherals
3. **Answer**: Deterministic

What are two considerations that would compel you to use an RTOS instead of bare-metal state machines for an embedded design?

1. **Answer**: Scheduler (handler for threads, equivalent to state machines)
2. **Answer**: Size of embedded application

What are the five main elements we will be using to develop RTOS-based applications?  
(Hint: the scheduler is not one of the answers.)

1. **Answer**: Threads
2. **Answer**: Mutexes
3. **Answer**:
4. **Answer**:
5. **Answer**:

What is the bare-metal equivalent of an RTOS scheduler?

1. **Answer**: while(true) loop

What are the two main methods a scheduler uses to manage the execution of threads?

1. **Answer**: Mutex
2. **Answer**:

Is Windows suitable for embedded applications? Explain your answer.

1. **Answer**: It depends; for some embedded applications like an airport display it would be despite having a non-deterministic structure, because inputs do not need to be handled in a guaranteed time period and a crash is not going to cost lives. For critical systems like flight controls in a plane, responsiveness must be consistent and guaranteed, and crashes cannot occur when lives are at stake.