CS148

Rex Programming Lab

Questions 1&2 Due in class Wednesday, February 10, 1999 Remaining Questions Due in class Wednesday, February 17, 1999

Write the following small Rex programs. A hard copy of your answers, including calls to makem, should be handed in in class on the due dates above, with an indication of where to look for your files if we need to access them on-line for some reason.

Be sure you test everything using rex-ex.

- 1. Implement a machine that takes two integer inputs and returns the minimum value.
- 2. Implement a machine that takes three floating inputs, a, b, and epsilon, and returns 1b if a is within epsilon of b and returns 0b otherwise.
- 3. Implement a *leaky integrator*. A leaky integrator takes a stream of input values and outputs a decayed sum of the values it has seen over time. At time t, its output, O_t , is

$$O_t = v_t + \gamma v_{t-1} + \gamma^2 v_{t-2} + \dots$$

We can write this recursively as

$$O_t = v_t + \gamma O_{t-1}$$

which ought to give you a clue how to do this in Rex. You can set γ to be the constant 0.9 and the initial value, t_0 , to be 0.

- 4. Make a machine that acts as a queue. It takes three inputs, item, operation, and go and has two outputs, queue-out and full.
 - If go is 0b, then the state doesn't change and queue-out is the top element of the queue. item and operation are ignored.
 - If go is 1b and operation is 0b, then you should add item to the end of the queue and queue-out is the top element of the queue.
 - If go is 1b and operation is 1b, then you should remove the top element of the queue and queue-out is the new top element of the queue. item is ignored.
 - If the queue becomes full (there is no room for another element), then the output full should be 1b; otherwise it should be 0b. If someone tries to do an insert operation (operation is 0b) when the queue is full, there will be no effect.

The Rex code that defines this machine should have a value parameter (only changeable at Rex compile time) that determines the number of queue elements. In the basic assignment, the queue elements should have type int. For extra credit, let the elements be of arbitrary type (fixed, of course, at Rex compile time).