

Homework 2  
UCR EE/CS120B: Introduction to Embedded Systems  
Fall Quarter 2004, Lecturer Brian Grattan

Due Tuesday, Oct. 12 at the BEGINNING of lecture.

Name: \_\_\_\_\_ **Solutions** \_\_\_\_\_

UCR ID#: \_\_\_\_\_

For this assignment, be sure to be neat! If you have sloppy handwriting consider using a graphical program like Dia, or Microsoft Visio.

1. (4 points) Create an algorithm to calculate the area under the curve described by  $x^2$  from 1 to  $d$  using piece-wise summation (basically, you are integrating). Also, you will have to do it for an arbitrary accuracy ( $a$ ) Do you remember how to do this from calculus? Here is the expression you are solving:

$$area = \sum_{i=1,1+a,1+2a,1+3a\dots}^d i^2 a$$

So, you will have three inputs:  $go$ ,  $a$  and  $d$  and one output:  $area$ . You do not have to include an infinite loop like is done in the book, but you should use the  $go$  signal to start the whole process.

2. (6 points) Convert the algorithm you made in problem 1 into a state machine with data using the templates from the book.

3. (10 points) Create a data path and the FSM for the FSMD you created in problem 2.

Also, if you are interested, there is a nice resource on integration at:

<http://www.mathcentre.ac.uk/resources/workbooks/mathcentre/web-integrationreversediff.pdf>

```
1.  
while (!go){}  
a_reg = a  
d_reg = d  
sum = 0  
i = 1  
while (d_reg >= i) {  
    sum = sum + i * i * a  
    i = i + a  
}  
area = sum
```

2. For the diagrams, see second PDF file.