Name: Id#

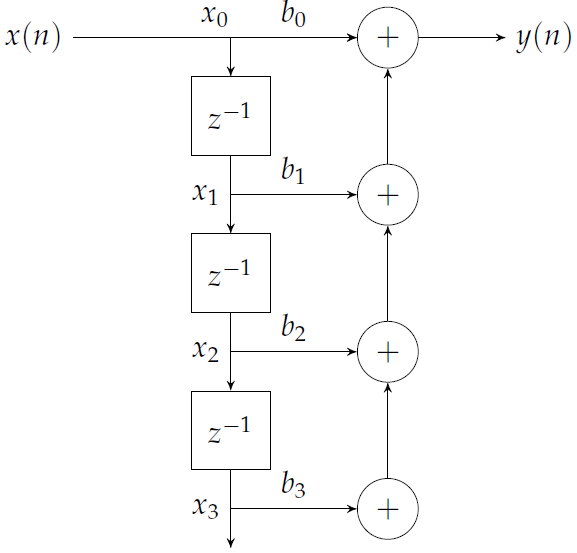
COE 306, Term 161

Introduction to Embedded Systems

Quiz# 4

Date: Sunday, Dec. 4, 2016

# **Q1.** It is required to implement the following FIR filter using a circular buffer:



# Define the necessary variables for the circular buffer.

# Show the C code for the function init( ) for initializing the buffer.

# Show the C code for the function put( ) for adding a new value to the buffer.

# Show the C code for the function get( ) for getting a value from the buffer. The function gets the ith value from the circular buffer with zero being the newest value.

# Show the C code for the function fir( ) that receives a new value x(n) and returns a computed value y(n) .

# **Q2.** Consider the data block given below:

w = a + b;

x = c + d;

w = w \* a;

x = x \* d;

y = x + w;

# Rewrite the given data block in single-assignment form, and then draw the data flow graph for that form.

# Determine the minimum number of registers required to perform the operations when they are executed in the order shown in the code. Show the lifetime graph.

# Determine the order of execution of operations that gives the smallest number of required registers and state the number of registers required. Show the lifetime graph.