**Guided Solution for Tutorial 4**

Q2-4 Draw the digital network for the system whose difference equation is:

*y*(*n*) = 0.5*x*(*n*) + 0.8*x*(*n* – 1) + 0.7*y*(*n* – 1) – 0.2*y*(*n* – 2)

We can break this into 2 parts, feedforward portion, 0.5*x*(*n*) + 0.8*x*(*n* – 1) and feedback portion, 0.7*y*(*n* – 1) – 0.2*y*(*n* – 2).

**Hint:** Page 80, Example 2-2, Figure 2.13 of the textbook



Feed Forward portion Feed Back portion

Figure 2.13 Digital network of the system

Q2-5 (a) Explain what the impulse response of a system means.

1. A system is described by the difference equation,

*y*(*n*) = 0.5*x*(*n*) + 0.5*x*(*n* ­– 1).

Calculate, for 0 ≤ *n* ≤ 5:

1. The system impulse response, *h*(*n*).
2. The output, *y*(*n*), if *x*(*n*) = {1, 0.5, –2}.

For part (a), the definition is given in Section 2.5.

For part (b), we notice that there is no y(n-1) or y(n-2) feedback portion. Some useful materials from Section 2.6, Table 2.2 and Example 2.5 can be used to solve this problem.

For part (b)(i), if we replace x(n) by δ(n) and x(n-1) by δ(n-1) (linearity), we can obtain h(n).

Using convolution method or the graphical method, we can solve part (b) (ii).

**Hint:** Page 78, Example 2-1, Figure 2.10 & Page 81, Section 2.4.1, Linear systems of the textbook