# SOLUTION

**Name: WEI ZHIFENG**

**Matriculation Number: G2002825F**

1. **Question 1**

Cut-off frequency:

Length: 21

Coefficients:

0xFFFF

0xFFF8

0xFFEE

0x0001

0x008A

0x0221

0x054E

0x0A10

0x0F78

0x13D9

0x158A

0x13D9

0x0F78

0x0A10

0x054E

0x0221

0x008A

0x0001

0xFFEE

0xFFF8

0xFFFF

1. **Question 2**
2. An input signal is quantized to () binary fractional bits

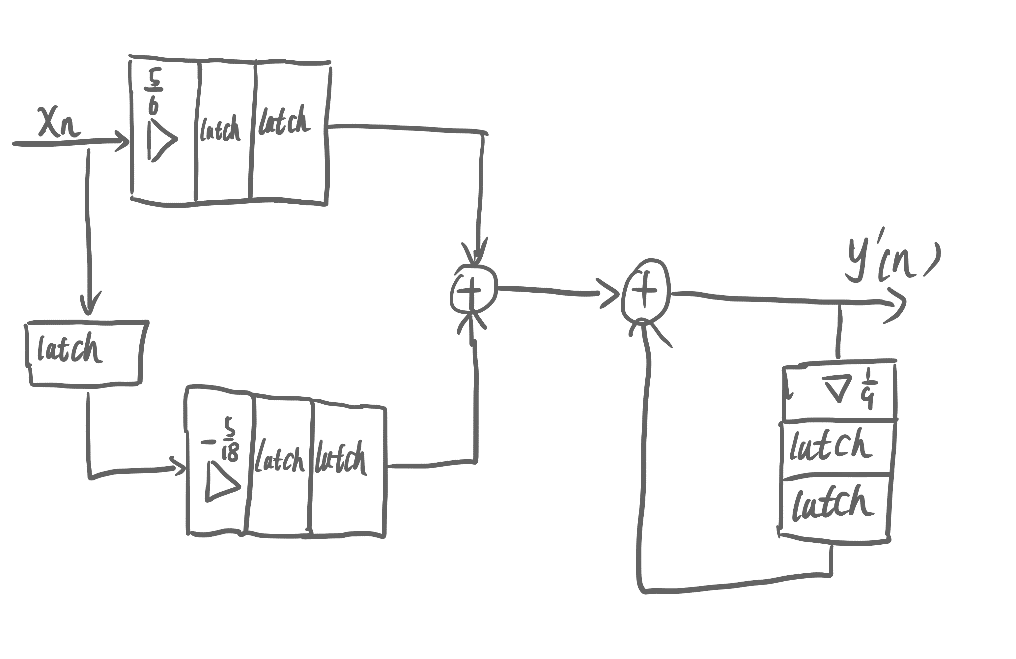
So the quantization step is : = 0.125

1. Variance of the quantization error is : =
2. The output noise variance is:
3. **Question 3**

The recursive filter is

So the output y(n) without using y(n-1) for such a pipelining is :

1. Pipelining structure



So the output is : =