Task1. (a). $F_s = \frac{1}{0.0006} \approx 1666.7\,Hz$.

$\because 1000 > \frac{F_s}{2}$ $\therefore$ aliasing occur.

(b) frequency $= \frac{F_s}{2} = 833.3\,Hz$.

(c) prevent aliasing need. $1000 \leq \frac{F_s}{2}$.

$F_s \geq 2000$. $\therefore$ 2000 Hz. is sufficient to prevent.

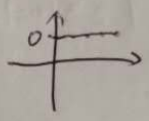
Task 2 (a). $x(t_1) = 0$.

$x(t_2) = \sin(\pi) = 0$

$x(t_3) = \sin(2\pi) = 0$

$x(t_4) = \sin(3\pi) = 0$

$x(t_5) = \sin(4\pi) = 0$.



Cannot be reconstructed to original signal.

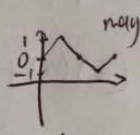
(b). $x(t_1) = 0$

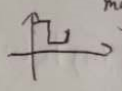
$x(t_2) = \sin(\frac{\pi}{2}) = 1$

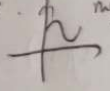
$x(t_3) = \sin(\pi) = 0$

$x(t_4) = \sin(\frac{3}{2}\pi) = -1$

$x(t_5) = \sin(2\pi) = 0$.





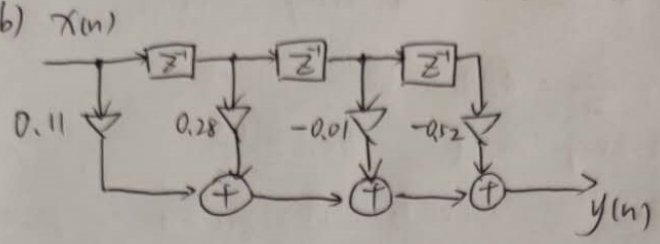


also cannot be reconstructed to original signal.

it can present some other signal having the same frequency.

Task3 (a). $y(n) = -0.2427x(n) - 0.2001(x-1) + 0.7794(x-2)$
$-0.2001(x-3) - 0.2427(x-4)$

(b)



Task4. left system:

$y(n) = 0.3x(n) - 1.2x(n-1) + x(n-2) + 0.3x(n-3)$

Right System.

$y(n) = F_1(F_2(x(n))) = h_1(n) h_2(n)$.

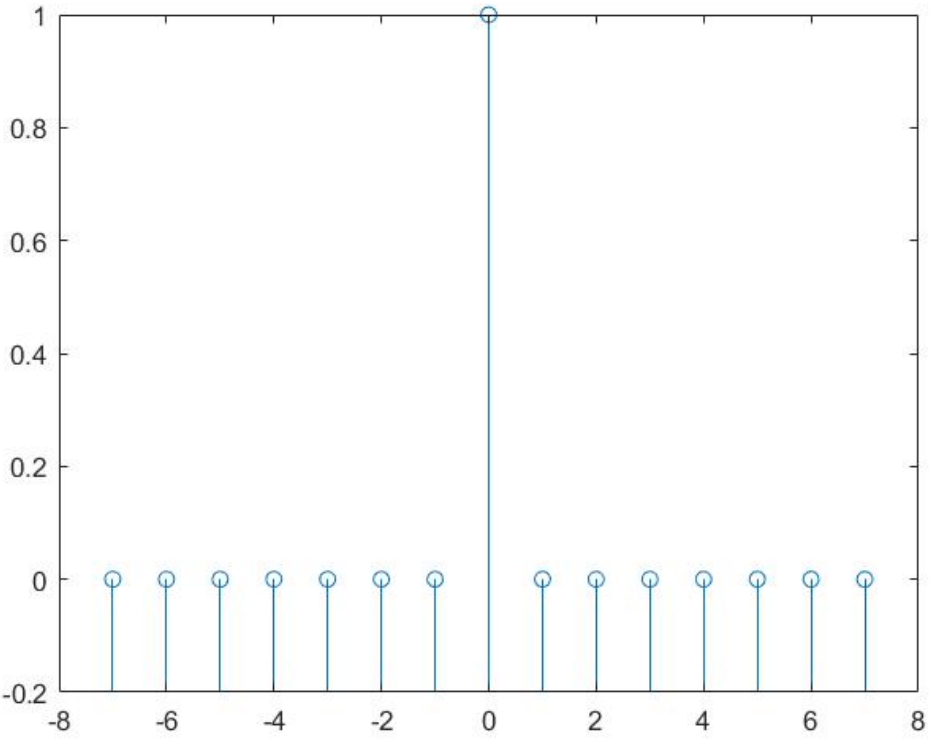
$h_1(n) = 3x(n) + x(n-1) + x(n-2)$

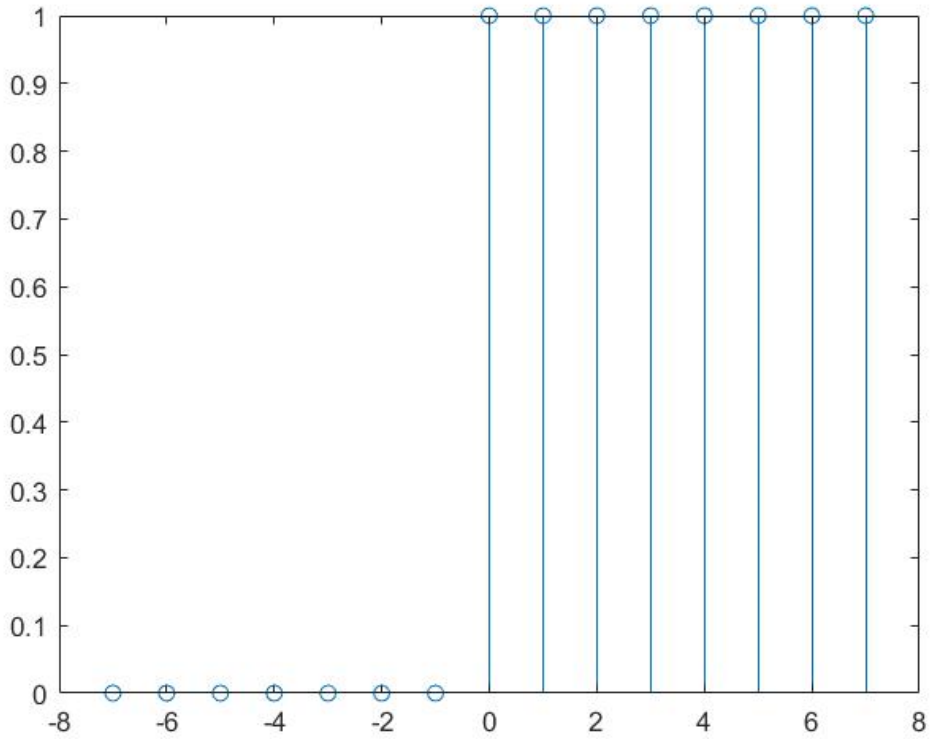
$h_2(n) = x(n) - 2x(n-1) + x(n-2)$.

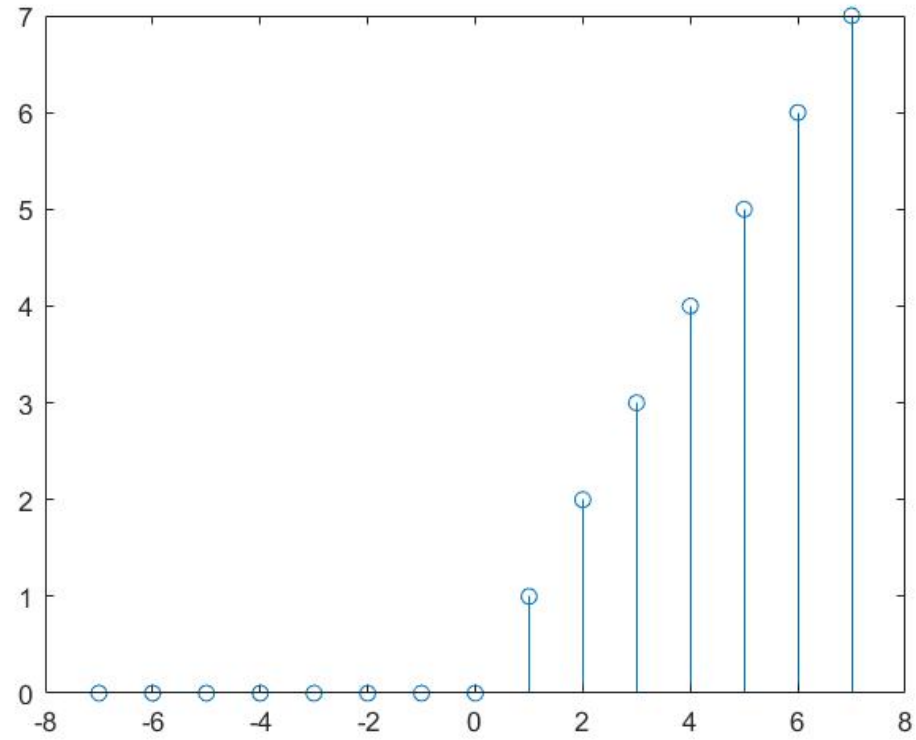
$y(n) = h_1(n) h_2(n) = [3x(n) + x(n-1) + x(n-2)] \times [x(n) - 2x(n-1) + x(n-2)]$

>> ex_2_main

task


1
0.8
0.6
0.4
0.2
0
-0.2
-8
-6
-4
-2
0
2
4
6
8


1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-8
-6
-4
-2
0
2
4
6
8



task 6

A3 =

1 to 9 col

1 8 27 64 125 216
343 512 729
1331 1728 2197 2744 3375 4096
4913 5832 6859
9261 10648 12167 13824 15625 17576
19683 21952 24389
29791 32768 35937 39304 42875 46656
50653 54872 59319
68921 74088 79507 85184 91125 97336
103823 110592 117649
132651 140608 148877 157464 166375 175616
185193 195112 205379
226981 238328 250047 262144 274625 287496
300763 314432 328509
357911 373248 389017 405224 421875 438976
456533 474552 493039

531441 551368 571787 592704 614125 636056
658503 681472 704969
753571 778688 804357 830584 857375 884736
912673 941192 970299

10 col

1000
8000
27000
64000
125000
216000
343000
512000
729000
1000000

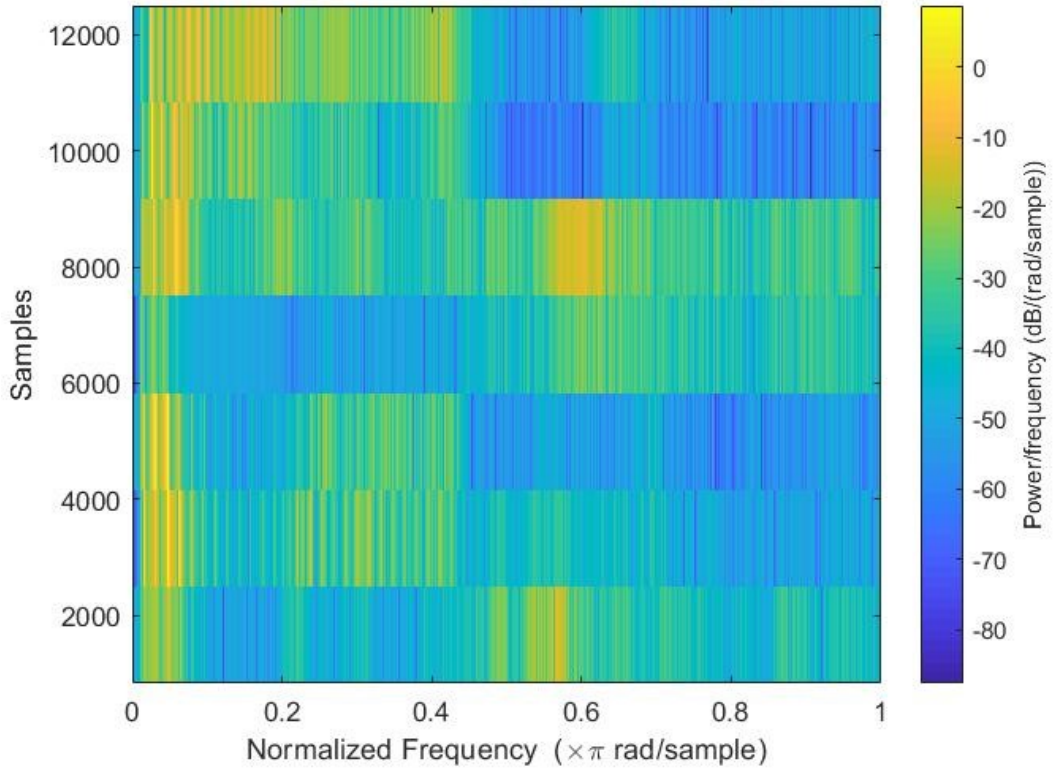
B =

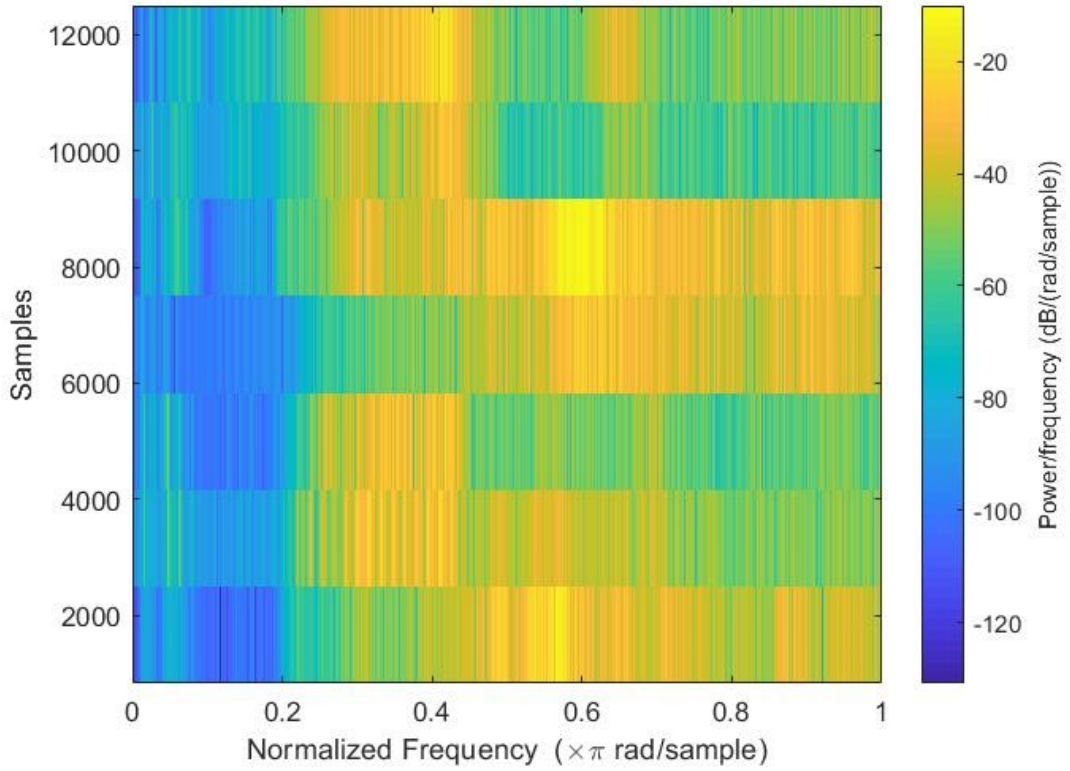
0.9189 0.5179 0.9668 0.6335 0.8757 0.7635 0.2260 0.6917
0.5437 0.6752
0.6025 0.2457 0.6192 0.9861 0.6352 0.0489 0.3610 0.8805
0.3146 0.6010
0.7021 0.2975 0.1653 0.2072 0.0973 0.7259 0.3246 0.9245
0.3820 0.3463
0.7437 0.6505 0.8262 0.7571 0.9084 0.7013 0.0836 0.0813
0.7915 0.3644
0.3851 0.8914 0.6557 0.8863 0.0350 0.4589 0.5127 0.4827
0.8392 0.1715
0.2515 0.8611 0.5465 0.4722 0.0397 0.5823 0.8329 0.1283
0.6802 0.7954
0.0368 0.2099 0.2513 0.1589 0.9886 0.3391 0.9046 0.2529
0.4169 0.4927
0.4721 0.3991 0.0402 0.8109 0.6862 0.1706 0.7236 0.8840
0.6429 0.3546
0.6451 0.8879 0.2334 0.4765 0.3767 0.3992 0.3830 0.1963
0.2141 0.7751
0.2790 0.2565 0.3611 0.1163 0.5043 0.9198 0.2980 0.1214
0.6173 0.2368

ans =

1.0000 -0.0000 -0.0000 -0.0000 -0.0000 0.0000 -0.0000 0.0000
-0.0000 0.0000
0.0000 1.0000 -0.0000 -0.0000 -0.0000 0.0000 -0.0000 0.0000
-0.0000 0.0000
0.0000 -0.0000 1.0000 -0.0000 -0.0000 0.0000 -0.0000 0.0000
-0.0000 0.0000
0.0000 -0.0000 -0.0000 1.0000 -0.0000 0.0000 -0.0000 0.0000
-0.0000 0.0000
0.0000 -0.0000 -0.0000 -0.0000 1.0000 0.0000 -0.0000 0.0000
-0.0000 0.0000
0.0000 -0.0000 0.0000 -0.0000 -0.0000 1.0000 -0.0000 0.0000
-0.0000 0.0000
0.0000 -0.0000 -0.0000 -0.0000 -0.0000 0.0000 1.0000 0.0000
-0.0000 0.0000
0.0000 -0.0000 -0.0000 -0.0000 0.0000 0.0000 -0.0000 1.0000
-0.0000 0.0000
0.0000 -0.0000 -0.0000 -0.0000 -0.0000 0.0000 -0.0000 0.0000
1.0000 0.0000
0.0000 -0.0000 -0.0000 -0.0000 -0.0000 0.0000 -0.0000 0.0000
-0.0000 1.0000

task 7





task 8
aliasing occur
task 9
task 10
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