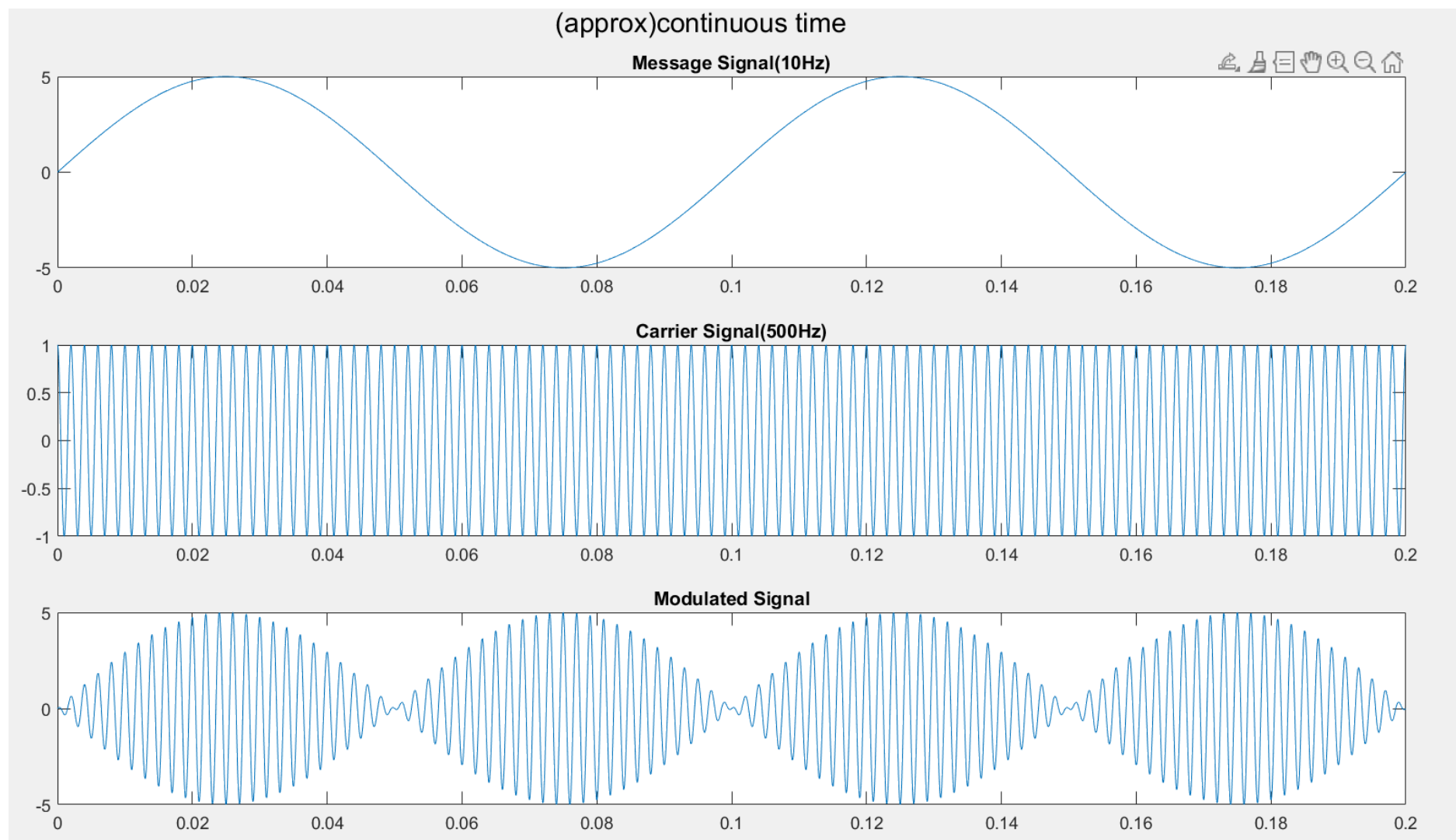


# SP Midsem Solutions

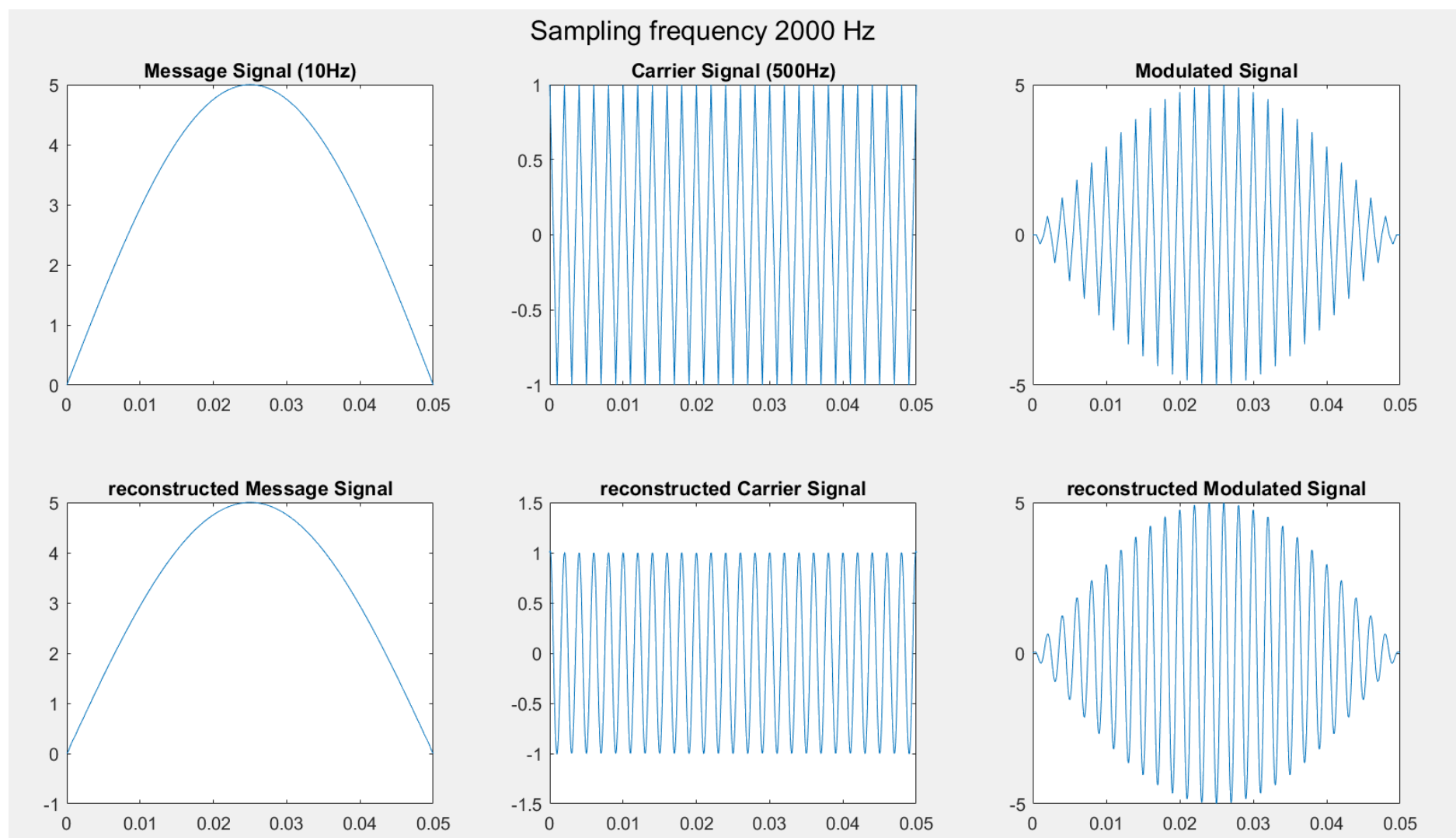
## Q1 (40)

### 1) plot continuous signal (3 M)



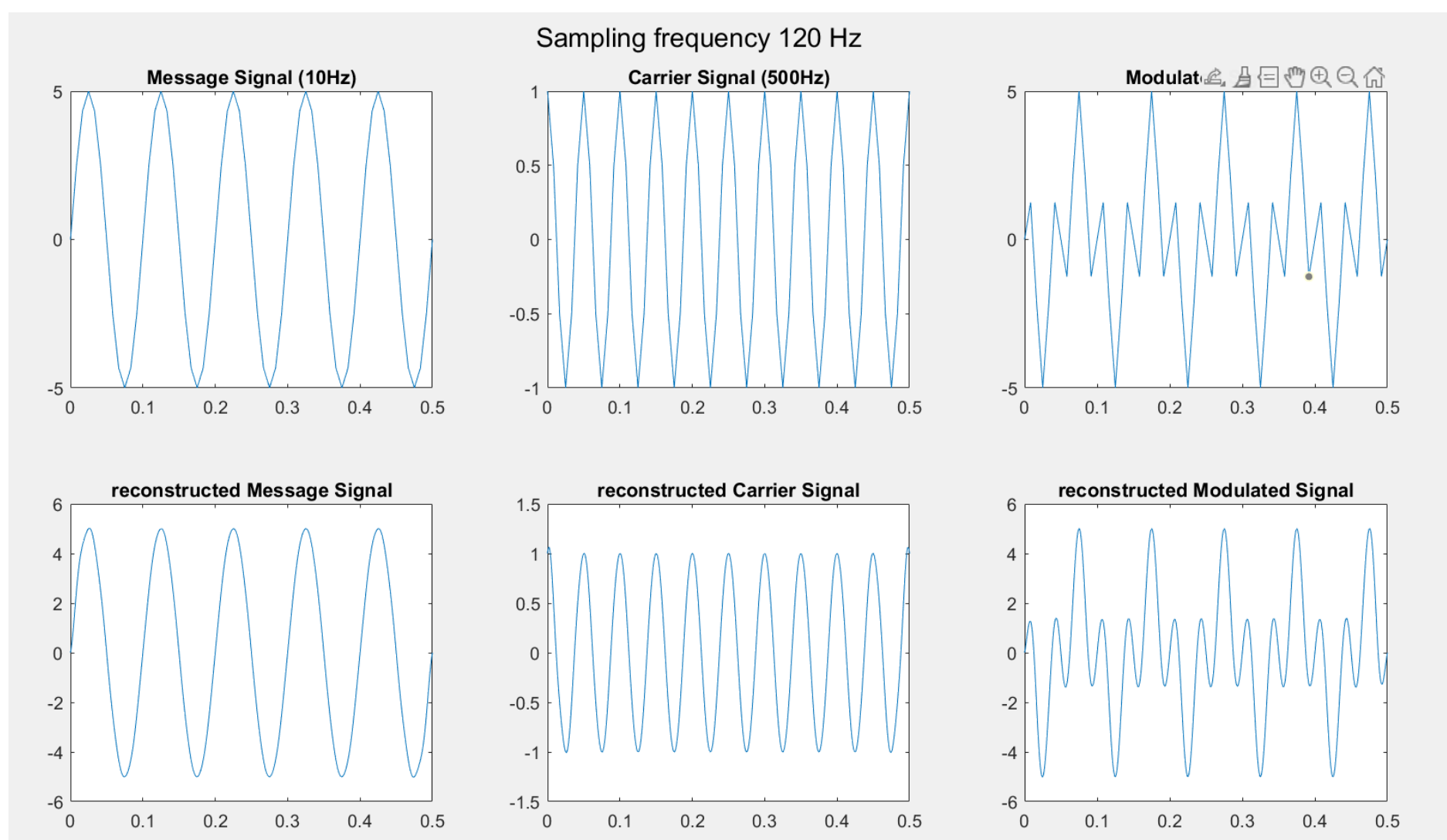
### 2) 17M

- a) 5M  $\Rightarrow$  1st row of below subplot
- b) 2M  $\Rightarrow$  must use sinc reconstruction
- c) 7M  $\Rightarrow$  sinc interpolation function or implementing it using inbuilt sinc command
- d) 3M  $\Rightarrow$  2nd row of below subplot



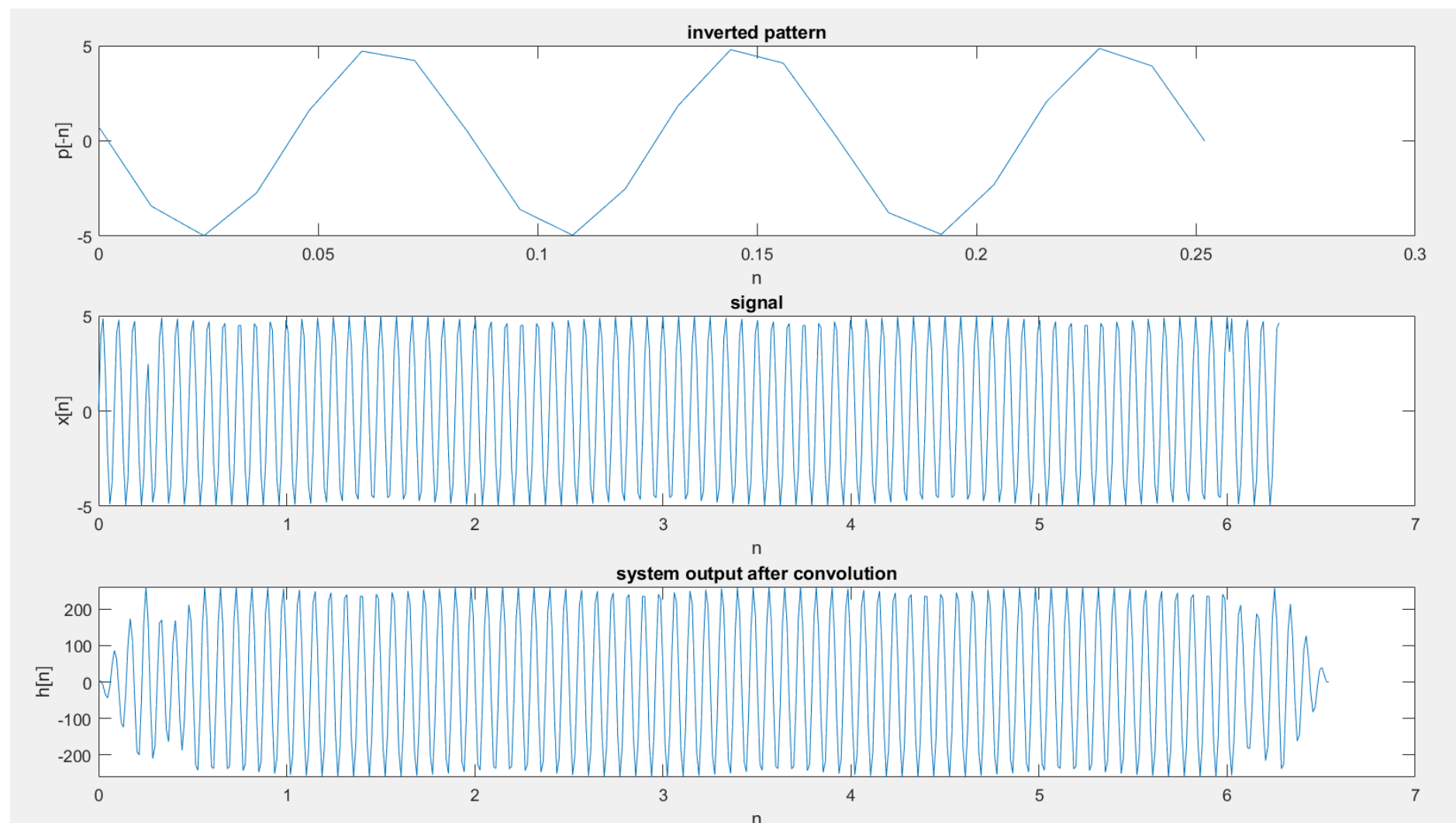
### 3)20M

- 3M  $\Rightarrow$  for all 6 subplots of below figure
- 3M  $\Rightarrow$  message did not change (1M) ; carrier changed (1M) ; modulated changed (1M)
- 3M  $\Rightarrow$  120Hz is greater than Nyquist rate of message but less than Nyquist of carrier and modulated
- 10M  $\Rightarrow$  new carrier freq
- 1M  $\Rightarrow$  increase or decrease

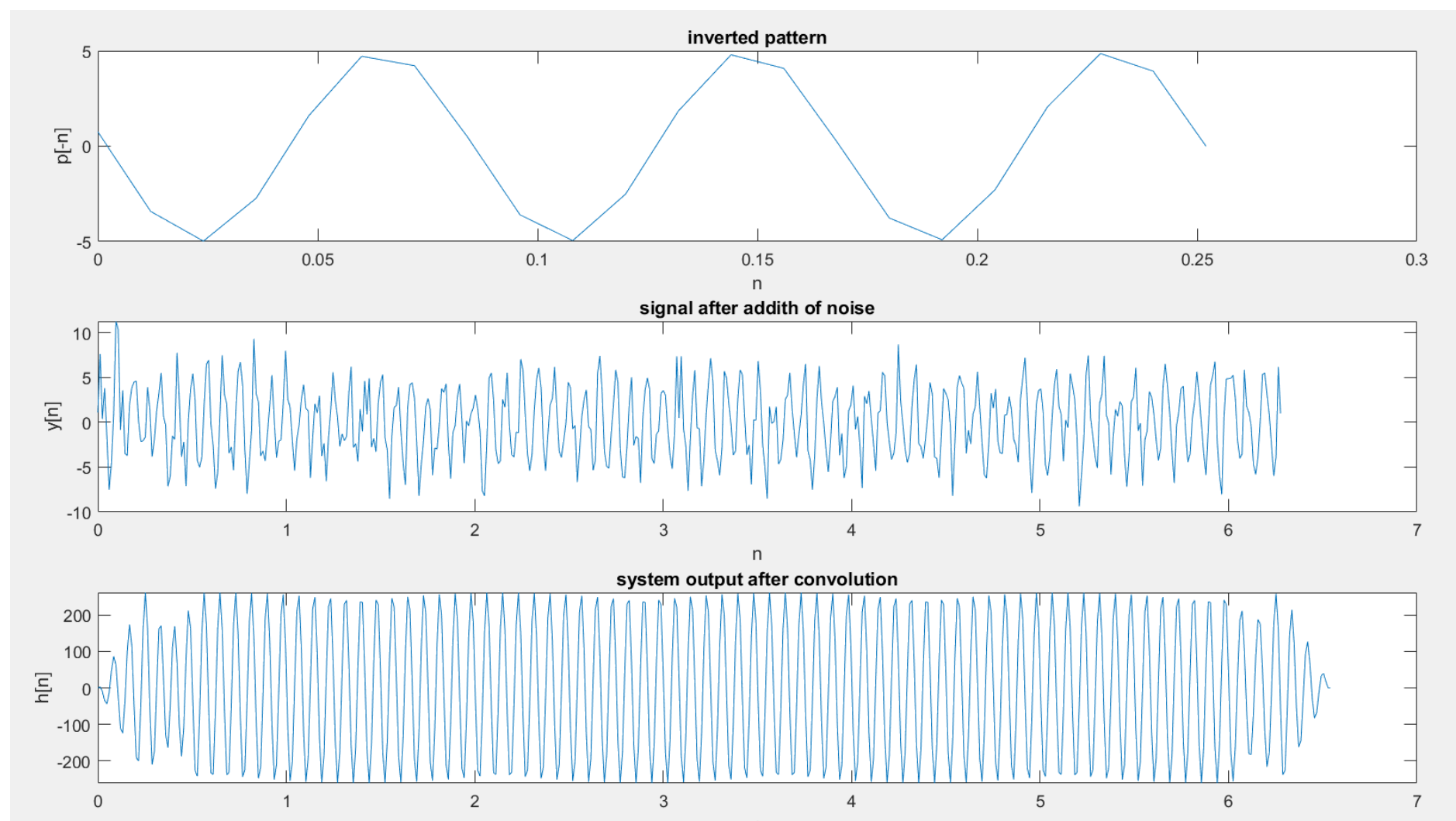


## Question 2 (20)

- 1) 5M  $\Rightarrow$  figure out that matched filter is ntg but correlation of  $p[n]$  and  $x[n]$  which is ntg but convolution of  $p[-n]$  and  $x[n]$
- 2) 5M  $\Rightarrow$  test over the given signal (output of passing the given signal through the given matched filter)



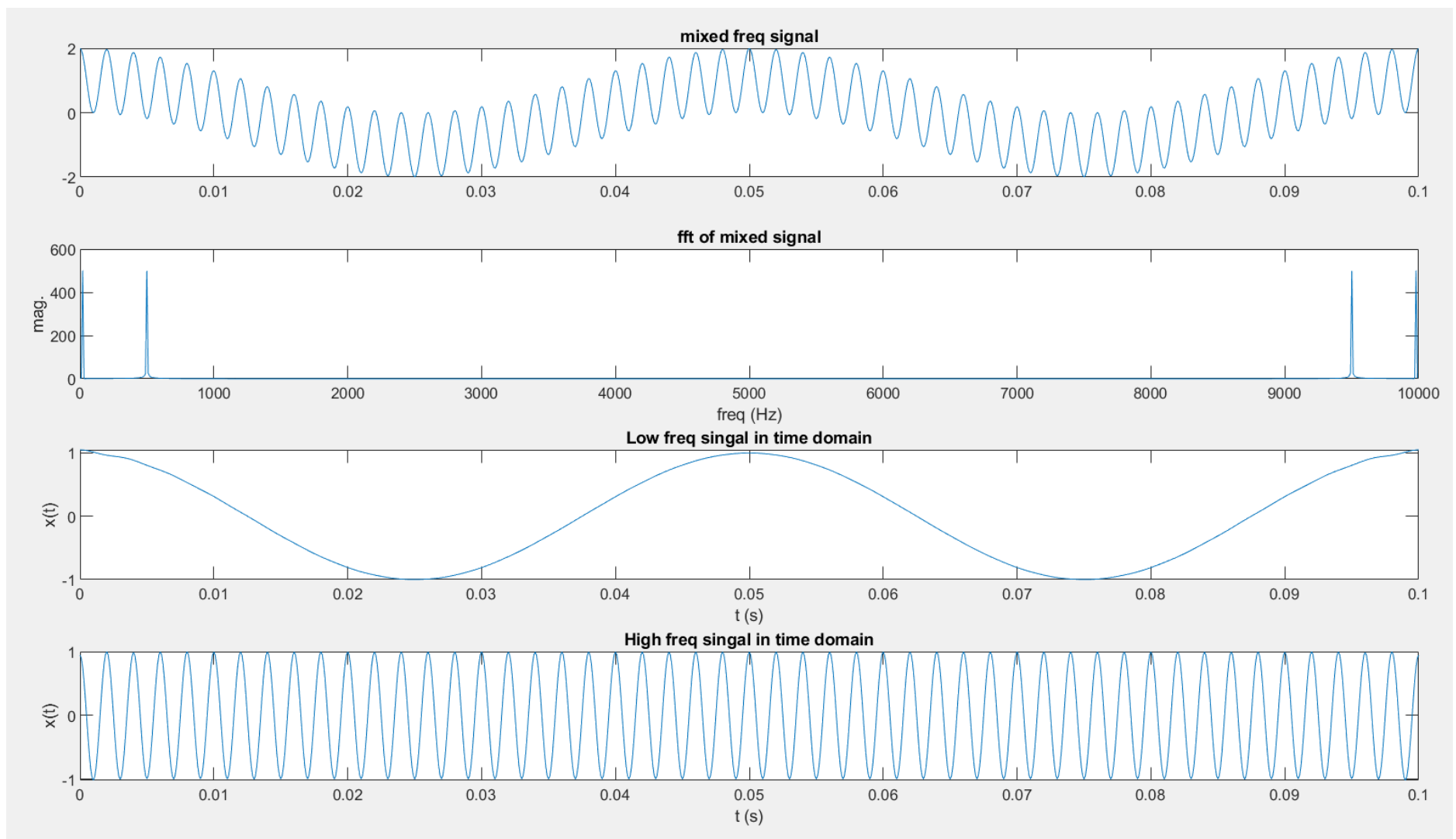
- 3) 8M  $\Rightarrow$  output of passing the noisy signal through the given matched filter



- 4) 2M  $\Rightarrow$  comment on the results

## Question 3 (25)

1. 10M  $\Rightarrow$  plot fft of singal with correct x axis( freq axis Hz)
2. 7.5M  $\Rightarrow$  plot the low freq signal
3. 7.5M  $\Rightarrow$  plot the high freq signal



## Question 4 (15)

- a) 7M DTFT function and plotting with correct w-axis
- b) 3M discretise
- c) 5M use ifft to find IDFT