

WELCOME  
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*"If you can think, you can  
Achieve"  
So start thinking..*

*Renu Raj Garg  
M.Tech (VLSI Design)  
13 Year of Teaching  
Experience  
Worked 10 Year in NTRO*



# GATE 2024



**प्रवाह** Batch

## COMMUNICATION

### SAMPLING THEOREM QUESTIONS

TIME- 9:00PM

RENU SIR





Chapter-2

**Digital Communications**

*In today's lecture we will cover the following Topics :*

1. *Sampling Theorem Questions*





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# GATE 2023 RESULT



**Congratulations  
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<b>AIR</b> <b>03</b> <b>ME</b> KUSHAGRA DUTT	<b>AIR</b> <b>05</b> <b>PI</b> HARSHIT KUMAR	<b>AIR</b> <b>07</b> <b>ME</b> RUSHI PRADIPKUMAR KARIYA	<b>AIR</b> <b>11</b> <b>CE</b> VINEET JAIN	<b>AIR</b> <b>30</b> <b>CE</b> RITIK BANSAL	<b>AIR</b> <b>36</b> <b>ECE</b> SUMIT KUMAR
<b>AIR</b> <b>64</b> <b>CE</b> UTKARSH MISHRA	<b>AIR</b> <b>71</b> <b>EE</b> SONESH SANJAY PAKAR	<b>AIR</b> <b>76</b> <b>CE</b> BIPANKAR DAS	<b>AIR</b> <b>87</b> <b>EC</b> SURAJIT RABI DAS	<b>AIR</b> <b>91</b> <b>EE</b> RISHABH GUPTA	<b>AIR</b> <b>111</b> <b>ES</b> ANIL GUPTA
<b>AIR</b> <b>130</b> <b>EE</b> SAURAV PATEL	<b>AIR</b> <b>136</b> <b>CE</b> RUPESH SACHDEVA	<b>AIR</b> <b>200</b> <b>ECE</b> WASIUZZAMA	<b>AIR</b> <b>212</b> <b>IN</b> WASIUZZAMA	<b>AIR</b> <b>217</b> <b>ME</b> VISHAL KUMAR	<b>AIR</b> <b>219</b> <b>ME</b> NITISH KUMAR
<b>AIR</b> <b>258</b> <b>EE</b> MAHAV	<b>AIR</b> <b>348</b> <b>EE</b> AMAN NAMDEV	<b>AIR</b> <b>392</b> <b>EE</b> GAURAV MAHAJAN	<b>AIR</b> <b>403</b> <b>EC</b> MOHAN KUMAR SINGH	<b>AIR</b> <b>567</b> <b>EE</b> SHANKAR JHA	<b>AIR</b> <b>571</b> <b>ME</b> VUENDER MEENA





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ELECTRONICS COMMUNICATION ENGINEERING

GATE 2024 & ALL PSU's



Start Apr 11, 2023

7:30 AM to 11:30 PM



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## EE & EC ENGINEERING

**EXAM TARGET**

**SUBJECT**

**TIME**

**FACULTY**

ALL PSUs

ENGINEERING MATHS

11:00 AM

ANANT SIR

GATE 2024-25

NETWORK THEORY

6:00 PM

RAVI SIR

GATE 2024-25

ELECTRICAL MACHINE

7:30 PM

SANTAN SIR

GATE 2024-25

COMMUNICATION

9:00 PM

RENU SIR



# FREE APP CLASS SCHEDULE



## EE & ECE ENGINEERING



<b>NETWORK THEORY</b>	<b>SATURDAY Live @11AM</b>	<b>RAVI SIR</b>
<b>COMMUNICATION</b>	<b>WEDNESDAY Live @8PM</b>	<b>RENU SIR</b>
<b>ANALOG ELECTRONICS</b>	<b>THURSDAY Live @8PM</b>	<b>LAWRENCE SIR</b>
<b>ENGINEERING MATHEMATICS</b>	<b>FRIDAY Live @11AM</b>	<b>ANANT SIR</b>
<b>ELECTRICAL MACHINE</b>	<b>MONDAY Live @8PM</b>	<b>SANTAN SIR</b>

SUM X  
TUE X



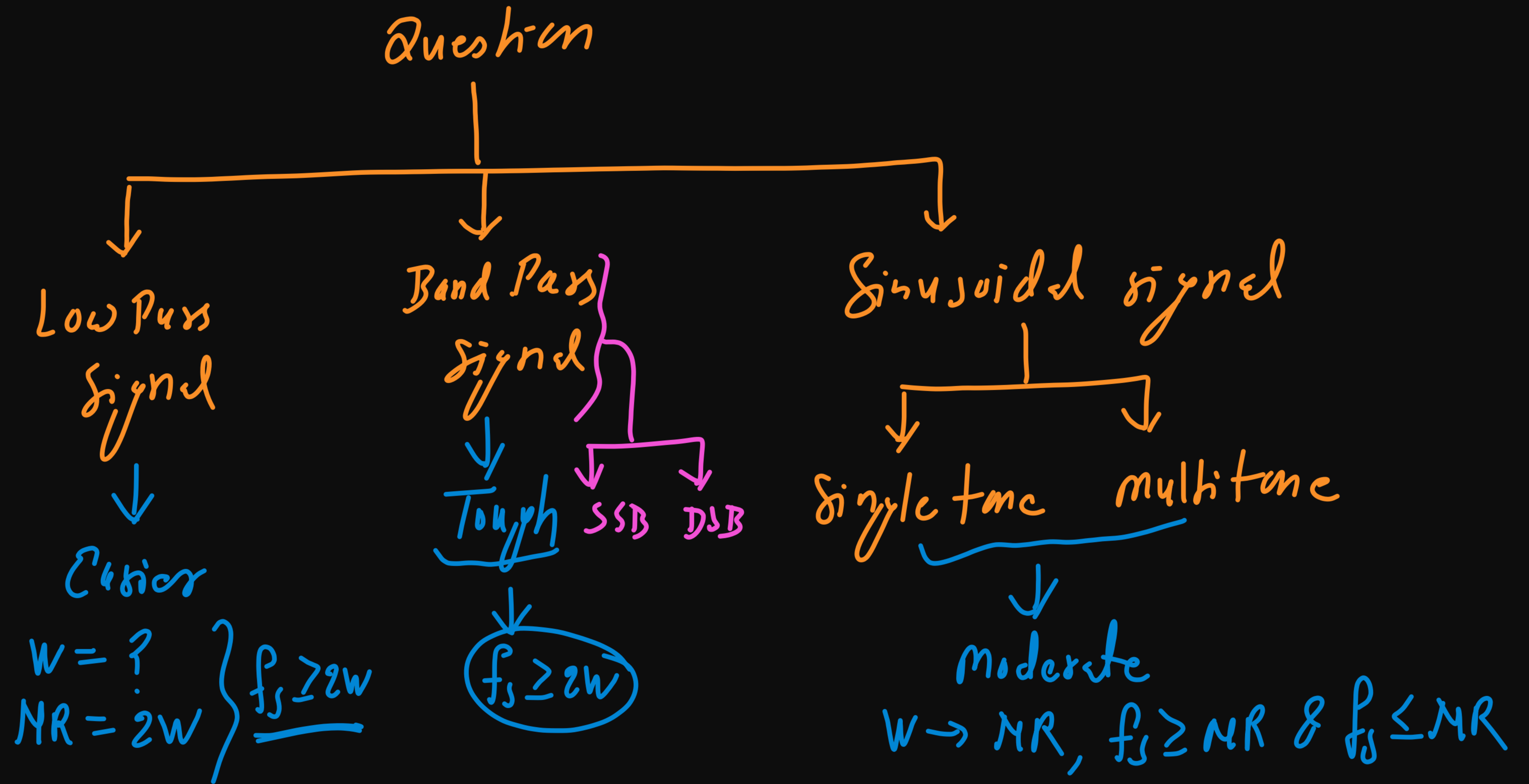
Sampling Theorem → Questions

→ Nyquist rate =  $MR$

$$f_s \geq MR$$

$$MR = 2W$$







Prob 1

$$m(t) = 5 \cos 2\pi \cdot 100t + 10 \sin 2\pi \cdot 200t + 20 \cos 2\pi \cdot 50t$$

(i)  $f_s = 500 \text{ Hz} > 2W$

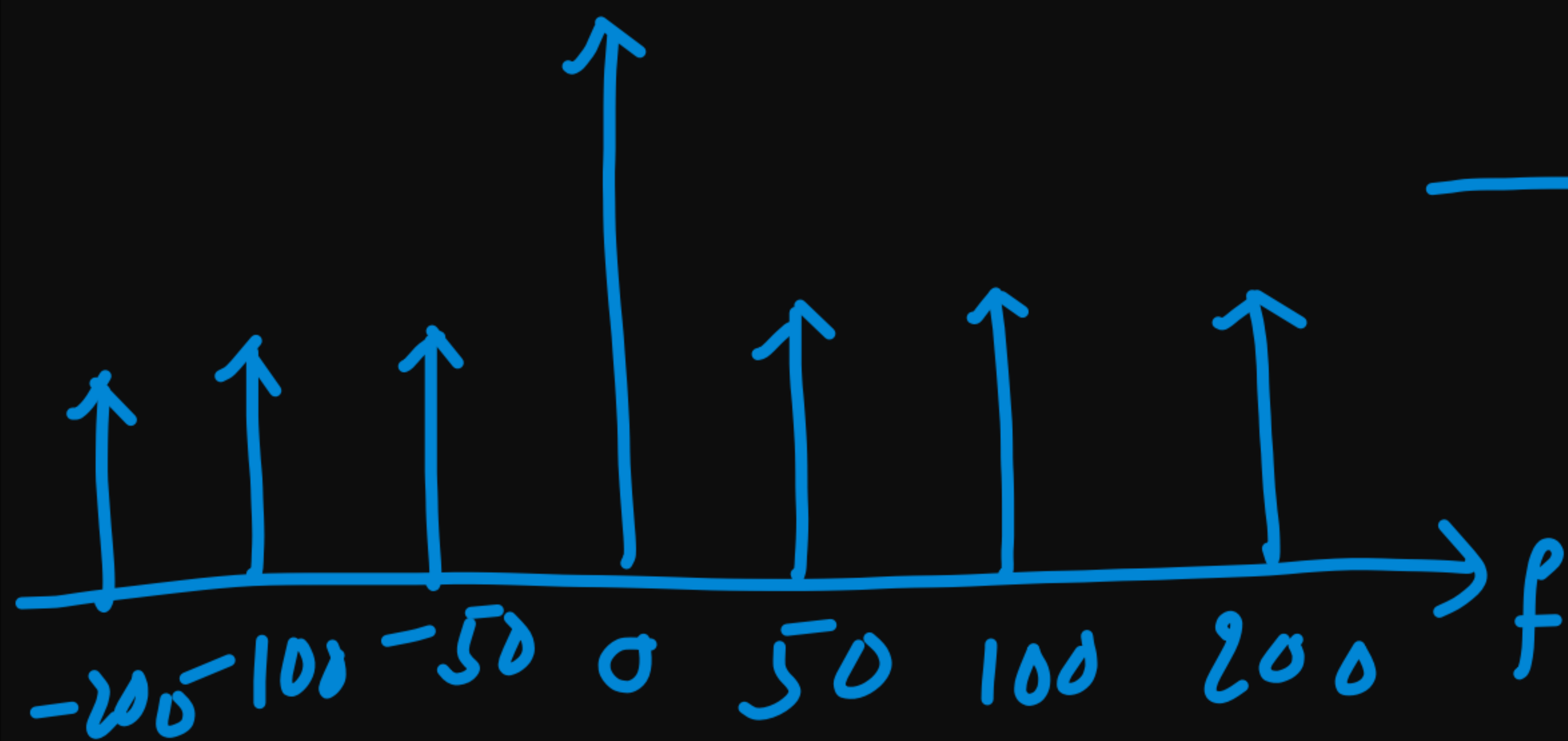
(ii)  $f_s = 100 \text{ Hz} < 2W$

LPF = 210 Hz  
freq. presention - the o/p

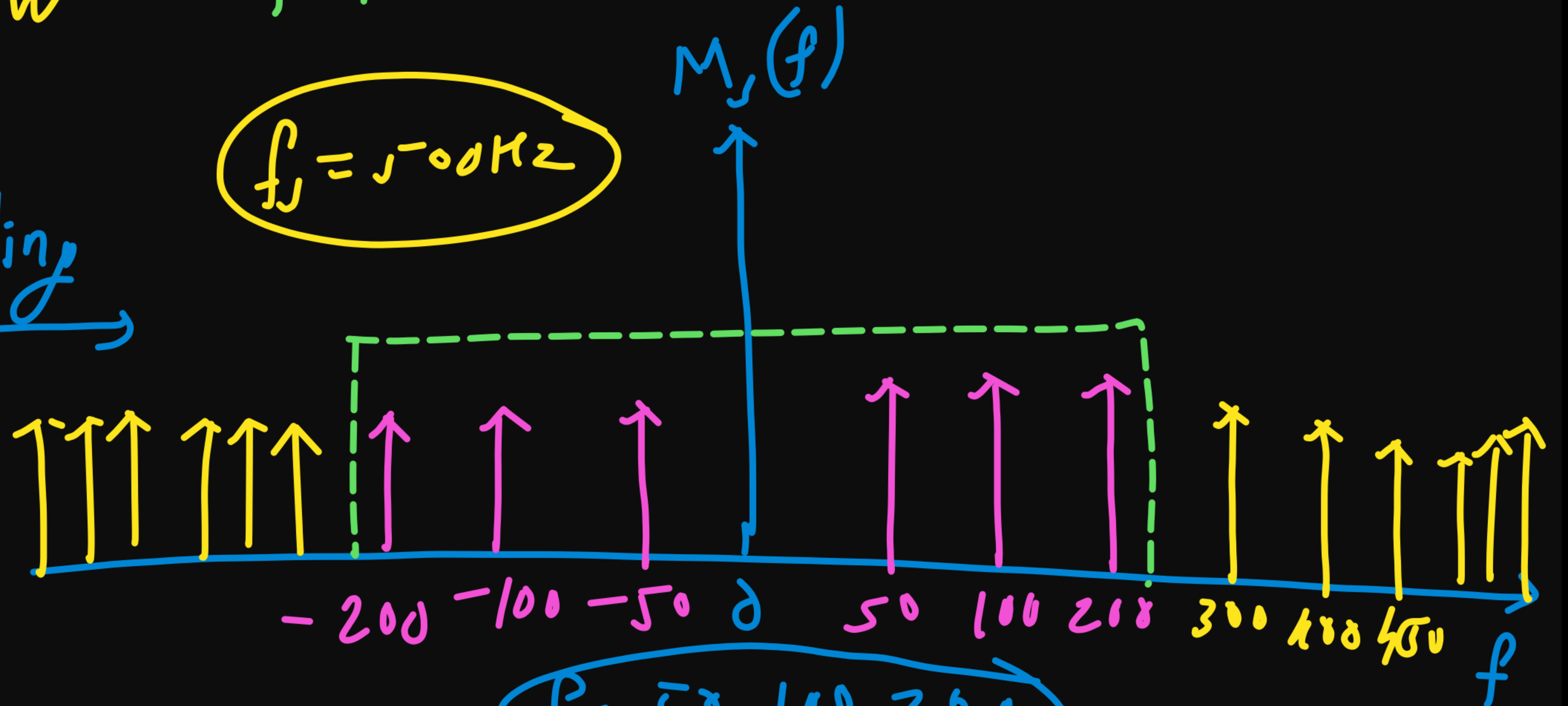
$W = 200 \text{ Hz}$   
 $NR = 2W = 400 \text{ Hz}$

$f_s = 500 \text{ Hz}$

$M(f)$

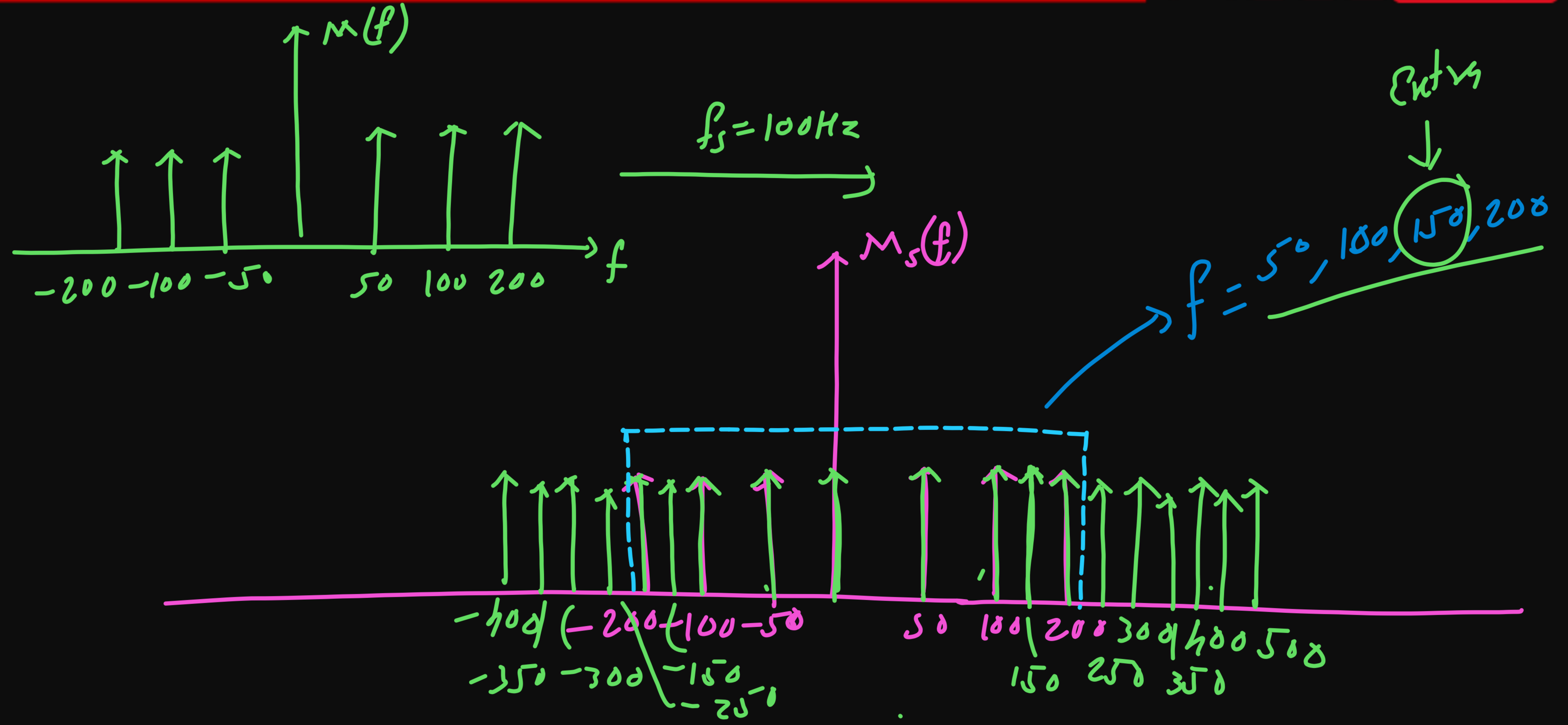


Sampling



$f = 50, 100, 200$

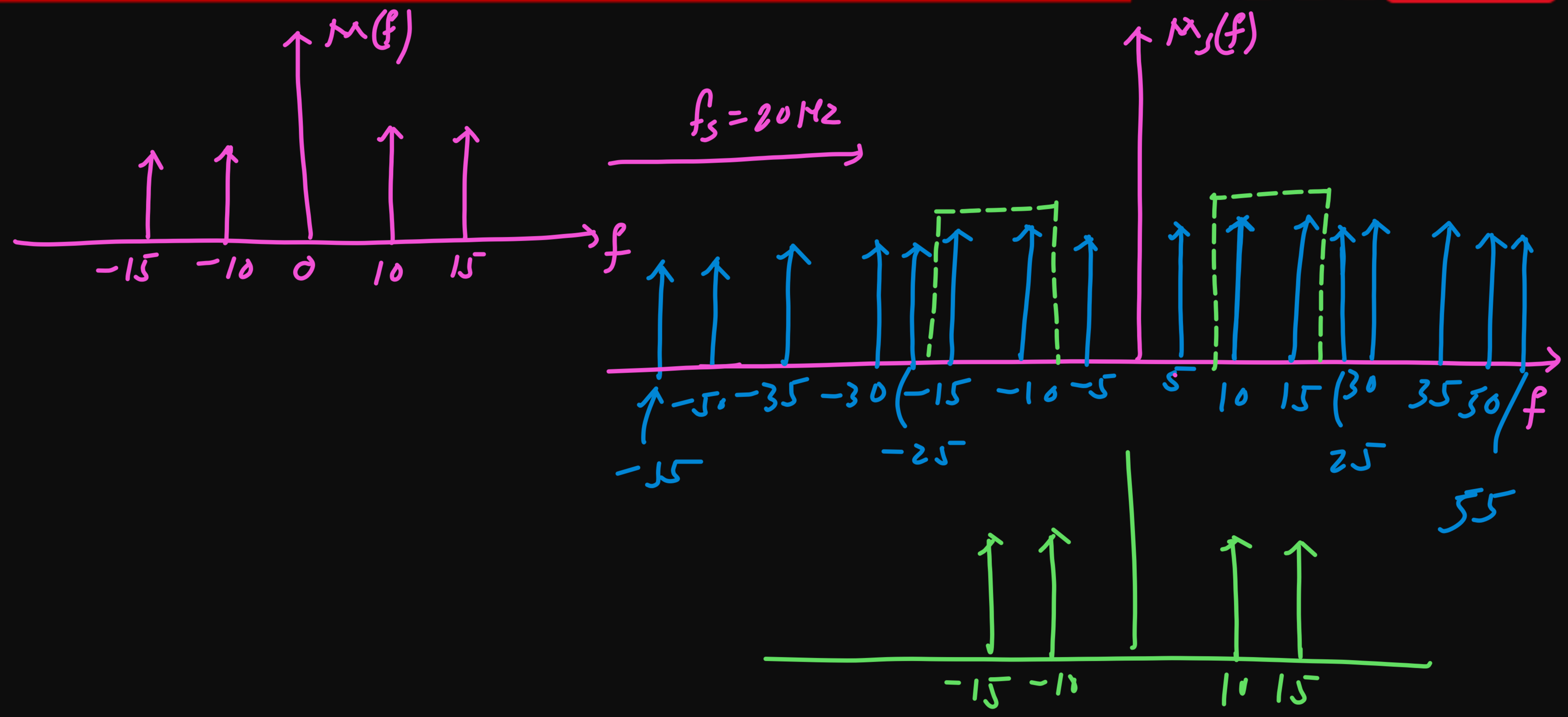














Prob 3

$m(t) = \text{sinusoidal}$   
1 KHz, 2 KHz, 5 KHz

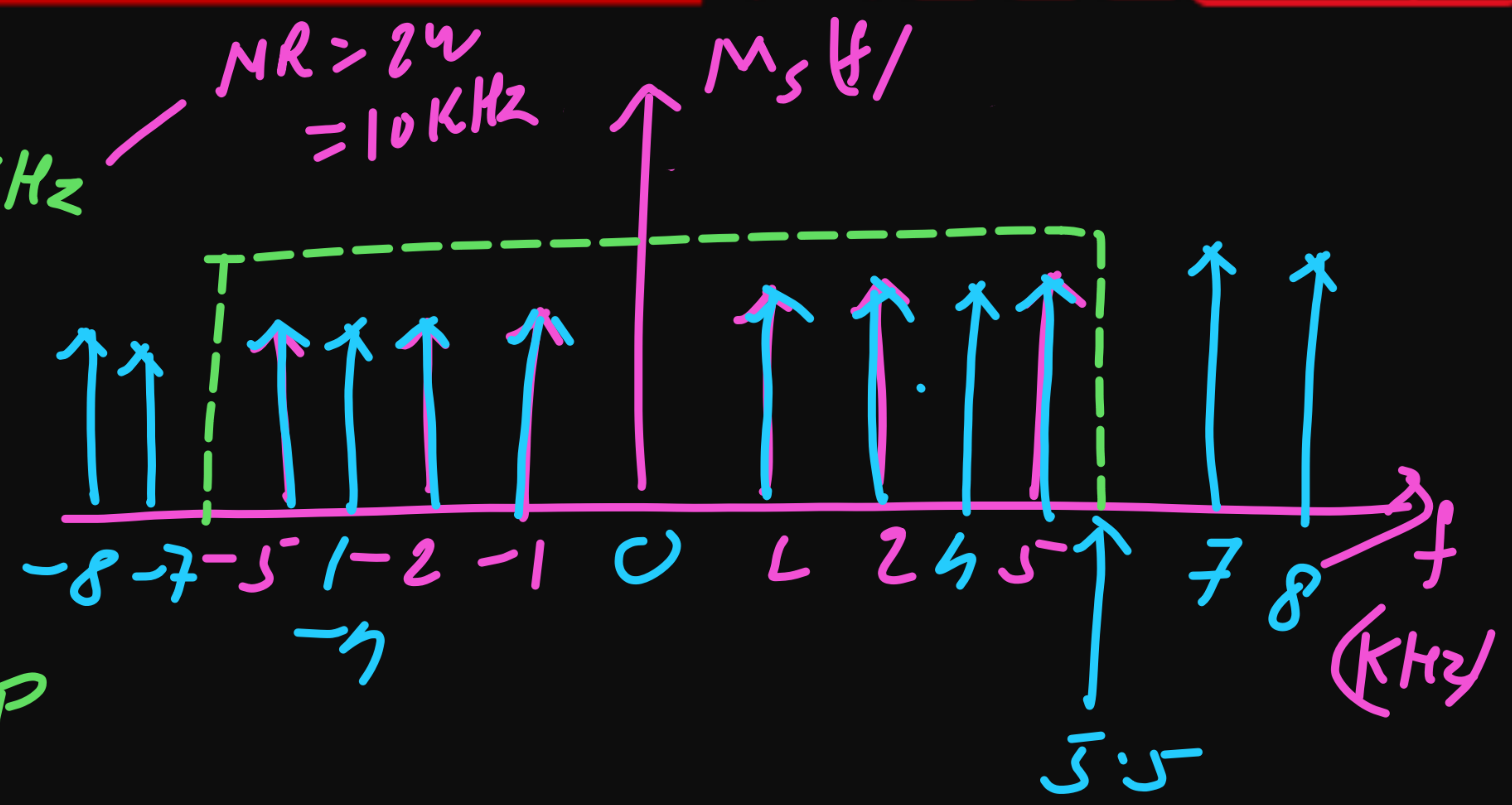
$f_s = 3 \text{ KHz}$   $f_s < NR$

LPF = 5.5 KHz

freq. component in o/p

i/s = 1 KHz, 2 KHz, 4 KHz, 5 KHz

Output

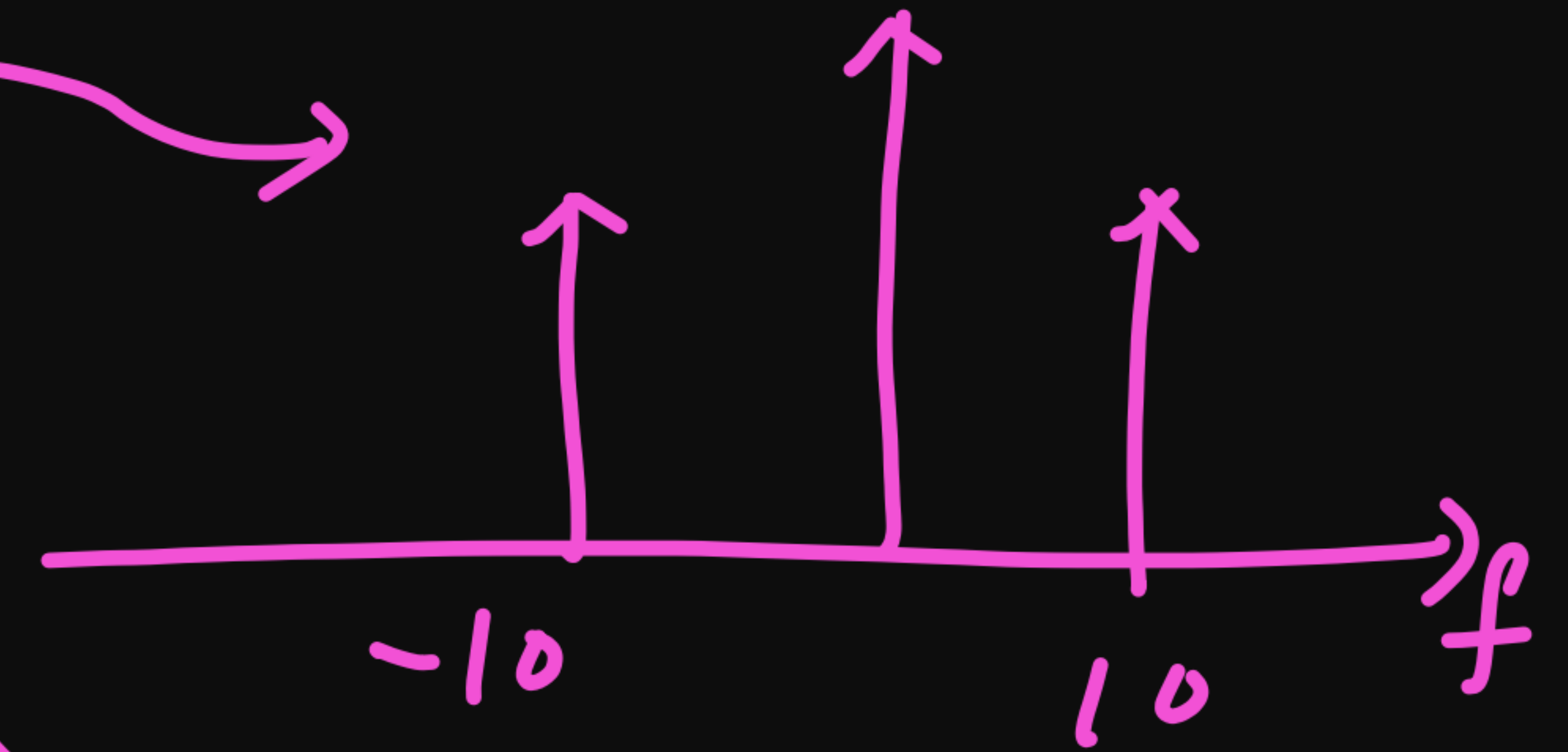




Prob 4

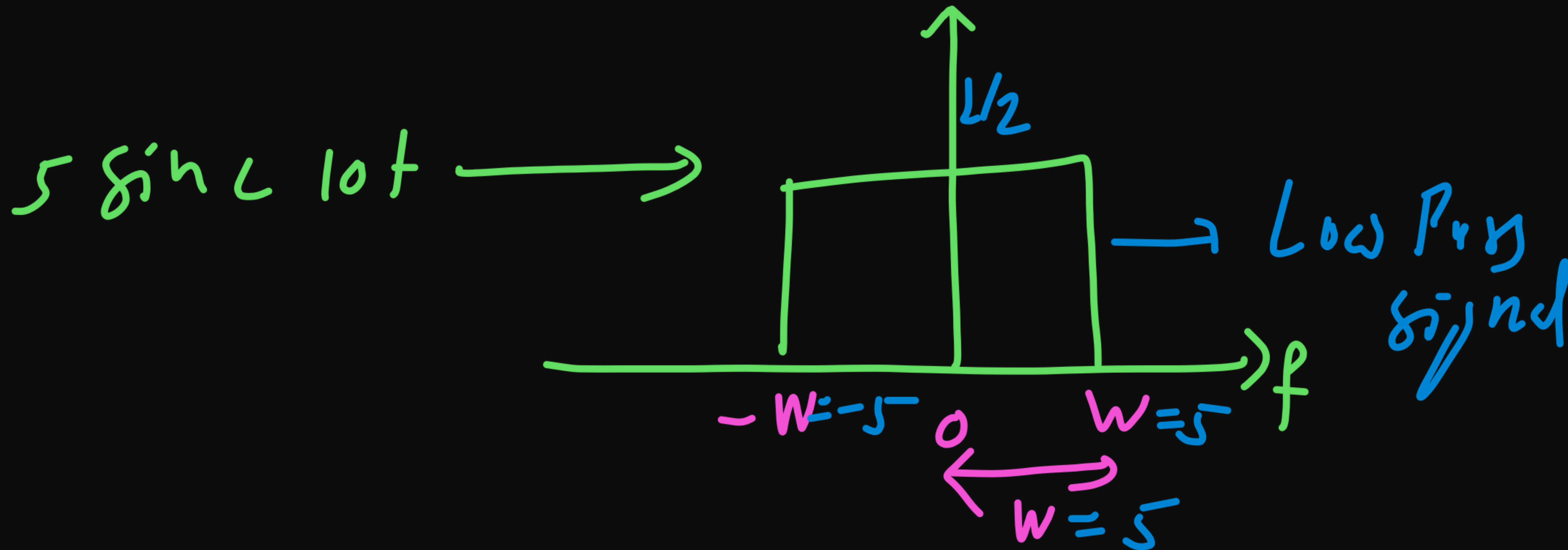
$m(t) = 5 \sin 2\pi \cdot 10t \rightarrow W = 10 \text{ Hz}$

$m(t) = 5 \sin c 10t \rightarrow W =$



sinusoidal  
single tone

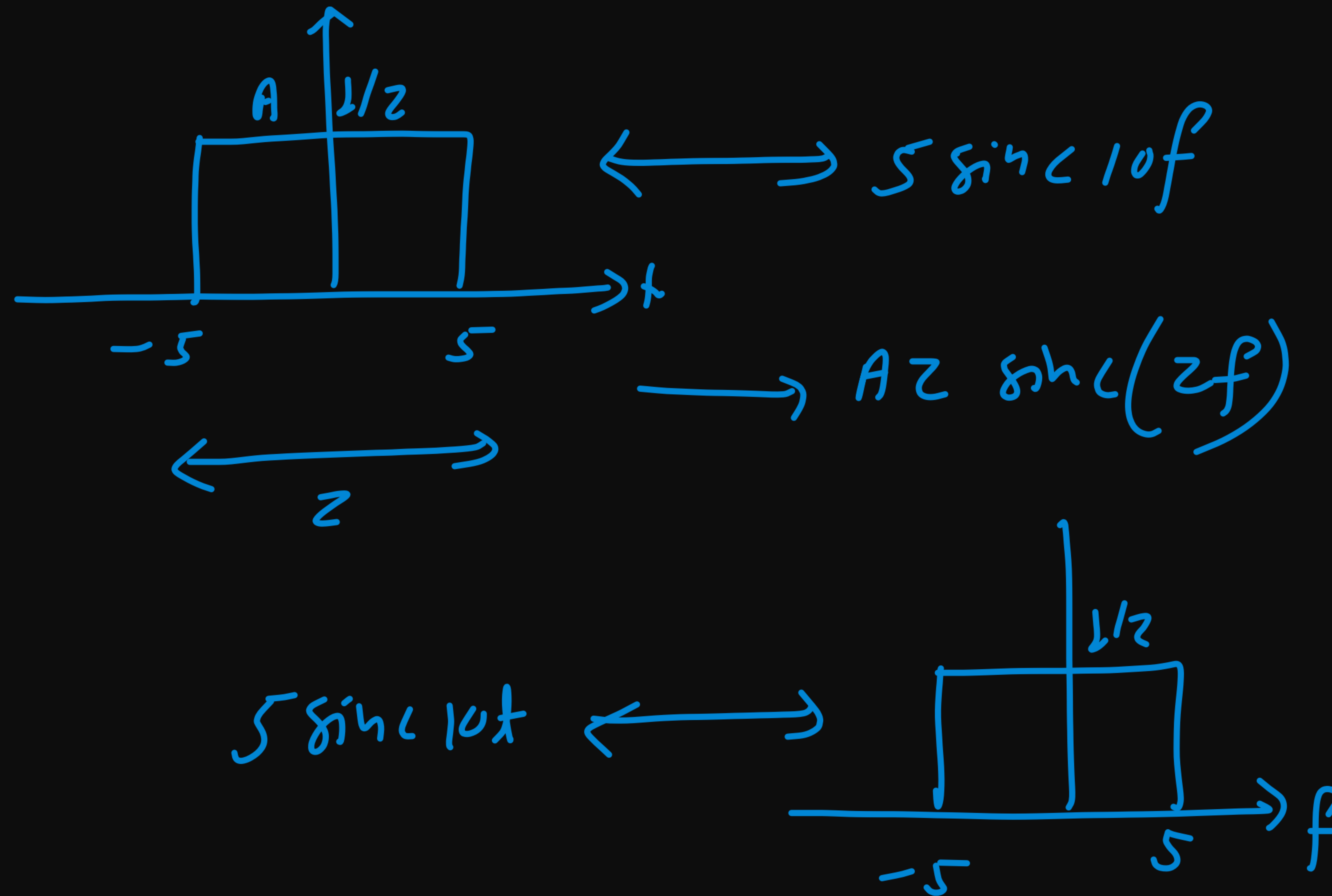
$$\left. \begin{aligned} f_s &\geq 2W \\ f_s &\leq 2W \end{aligned} \right\}$$



$NR = 2W = 10$

$f_s \geq 2W$







Prob

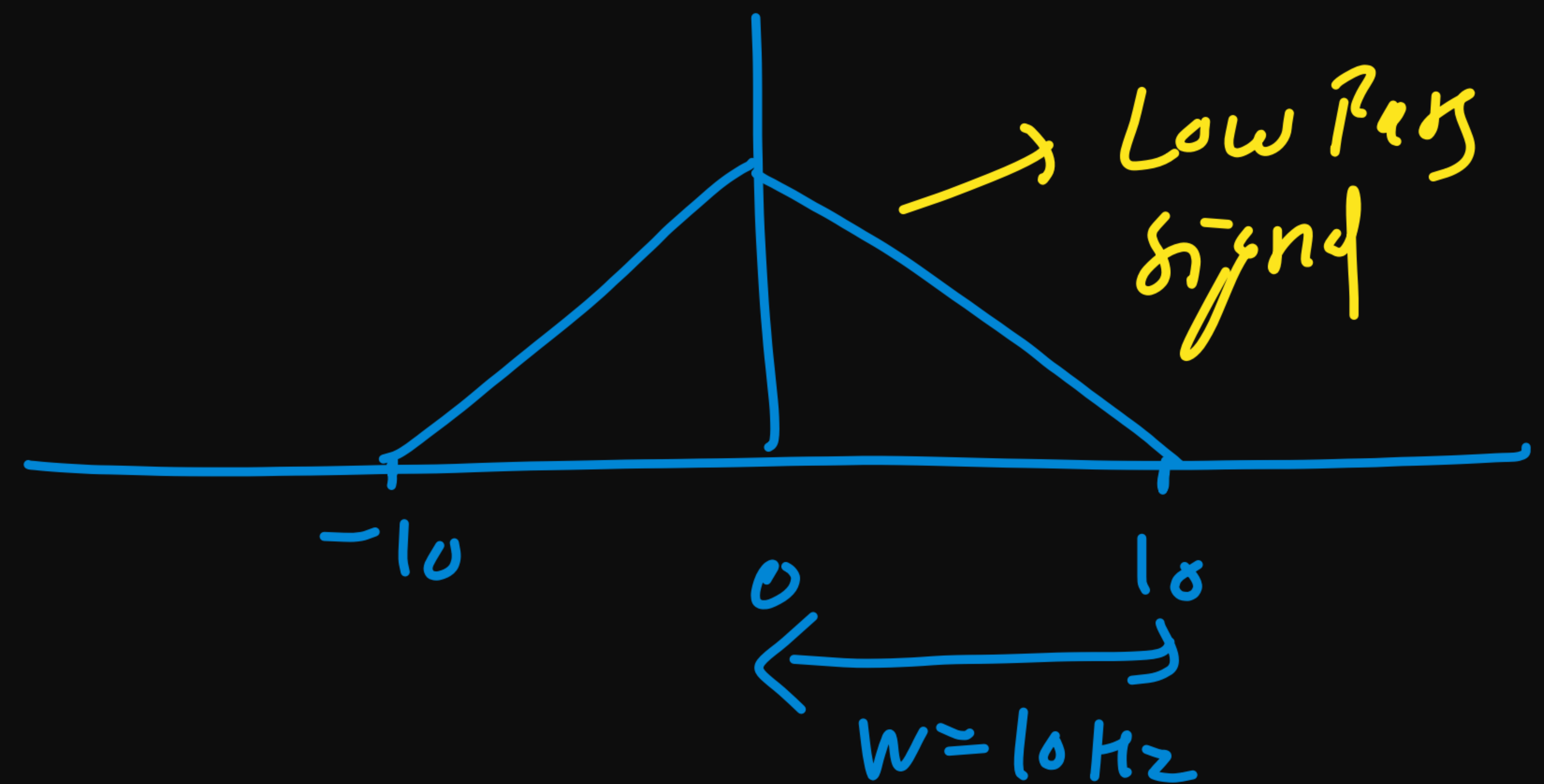
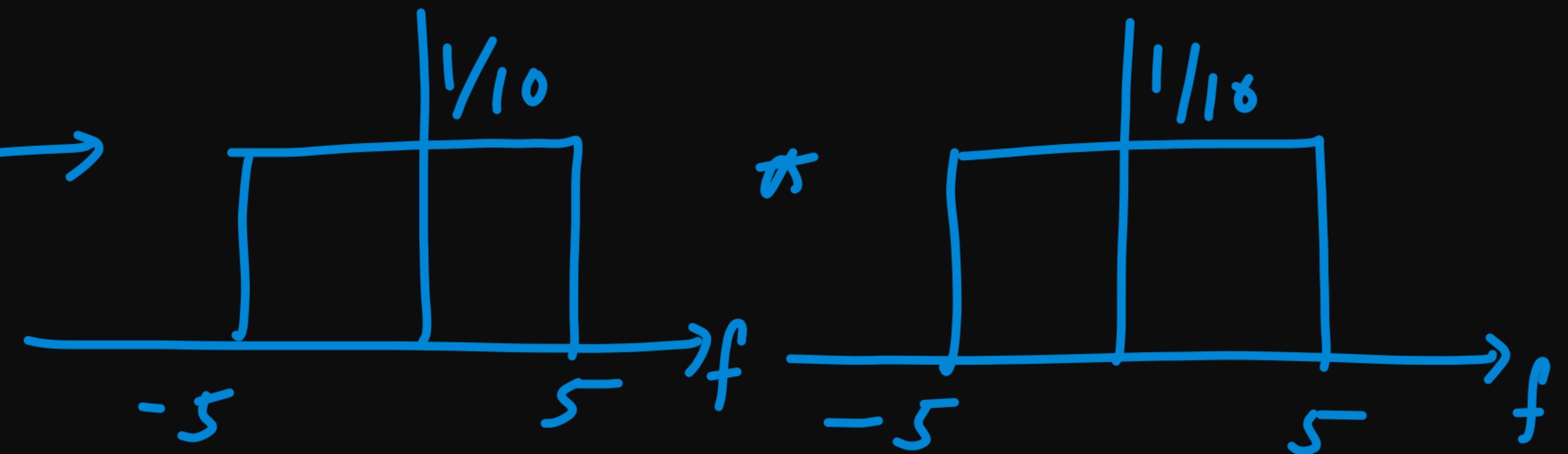
$$m(t) = 1 \operatorname{sinc}^2 10t$$

$$= \operatorname{sinc} 10t \cdot \operatorname{sinc} 10t \rightarrow$$

$$M R = 2W \\ = 20 \text{ Hz}$$

$$f_s \geq M R$$

$$f_s \geq 20 \text{ Hz} \checkmark$$





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