Math Lab 1

Write a MatLab function to construct a complex wave f(t) in time interval of [-4, 20].

$$f(t) = \underbrace{4}_{dc} + \underbrace{\sum_{n=1}^{\infty} \frac{2}{n\pi} \cdot (1 - \cos n\pi) \sin \frac{n\pi t}{4}}_{ac\ value}$$

$$f(t) = 2.5 + \left[-5/\pi \sum_{n=1}^{\infty} \frac{1}{n} (\cos n\pi - 1) \sin \frac{n\pi t}{4} \right.$$

here,

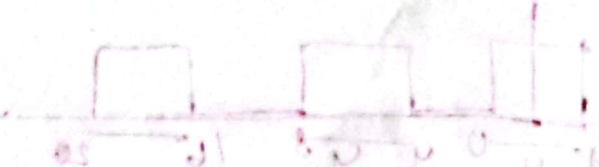
$$2.5 + \left[-5/\pi (\cos 0\pi - 1) \cdot \sin \frac{\pi t}{4} - \underbrace{\frac{5}{\pi} \frac{1}{2} (\cos 2\pi - 1)}_{0} \right.$$

$$\underbrace{\sin \frac{2\pi t}{4}}_{0} - 5/\pi \frac{1}{3} (\cos 3\pi - 1) \frac{3\pi t}{4} - \underbrace{5/\pi \frac{1}{4} (\cos 4\pi - 1)}$$

$$\underbrace{\sin \frac{4\pi t}{4}}_{0} - 5/4 \cdot \frac{4}{5} (\cos 5\pi - 1) \sin \frac{5\pi t}{4}$$

$$f(t) = 2.5 + \frac{10}{\pi} \sin \frac{\pi t}{4} + \frac{10}{3\pi} \sin \frac{3\pi t}{4} + \frac{10}{5\pi} \sin \frac{5\pi t}{4}$$

$$+ \frac{10}{7\pi} \sin \frac{7\pi t}{4}$$



Ex = 22

MathLab

» function four (5) n ← value এর দিলে

```
t = -4 : .001 : 20 ;
```

এটি loop এ save করে রাখে (.)
- upper limit
- lower limit

```
y = 2.5 ;
```
← dc value টি y রাখে

```
sum = y ;
```

এটি increment (কত difference)

```
for (i = 1 : 2 : 25)
```

i যেতে পারে AC value পর্যন্ত যাবে

```
sum = sum + (10/pi)*(1/i)* sin(i*pi*t/4)
```

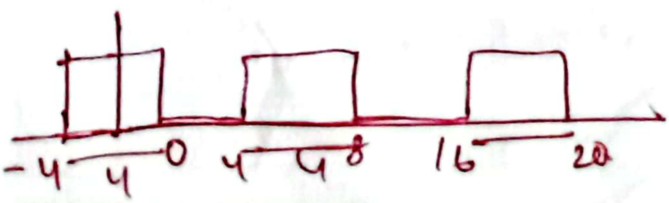
$10/\pi$; বাকি eq টির মধ্যে 1, 2, 3, করে (i) দিবে

```
end ;
```
← loop শেষ

```
figure (1) ;
```
← New window for showing graph

```
plot (t, sum) ;
```
→ t এর সাপেক্ষে sum

continue signal used হয়



Write Matlab code to sketch line spectrum (at least 6) for the following fourier series.

$x = \frac{1}{4}\cos 8t + \frac{1}{8}\sin 8t$

$A_1 = \frac{1}{4}$

$B_1 = \frac{1}{8}$

t = 0 : 0.01 : 1

$$f(t) = \frac{\pi}{2} + \sum_{n=1}^{\infty} \frac{1}{2n-1}\cos nt + \frac{(-1)^n}{2n}\sin nt$$

[line Spectrum]

here

n = 1 : 6 (..6 বলেছে at least)

ω = n (compare করলে [$n\omega_0 t = nt$] এখানে)

a = 1 ./ (2*n − 1) → (.) এর দিলে Save হবে কারণ n এর মান পরিবর্তন করে.

b = (−1 .^n) ./ (2*n) → [এখানে n আগে (.) দিলে কি Save হবে বুঝে]

r = sqrt (a .^2 + b .^2) → (.^) আগে দিলে কারণ a, b মান বসাবো Save হবে)

stem (ω, r) → Spectrum মান নির্ধারিত আছে.

what is the amplitude of the resultant signal.

$x = \frac{1}{4} \cos 8t + \frac{1}{8} \sin 8t$

(under the first 8: omeg; under the second 8: omega.)

here

$A_1 = \frac{1}{4}$

$B_1 = \frac{1}{8}$

t = 0 : 0.01 : 1;

[1 sec এর ভেতরে যে কয়টি পূর্ণকম্পন সম্পূর্ণ হয় তার জন্য (1)]

তাই 0 ---- 1.

[illegible] হয়

$\omega = 8$

y = A_1 * cos (ω * t)

z = B_1 * sin (ω * t).

x = y + z.

plot (t, y, t, z, t, x).

gf

$x[n] = 3 \quad n = 0$

$= 2 \quad n = 1$

and

$h[n] = 2 \; ; \; n = 0$

$= -2 \; ; \; n = 1.$

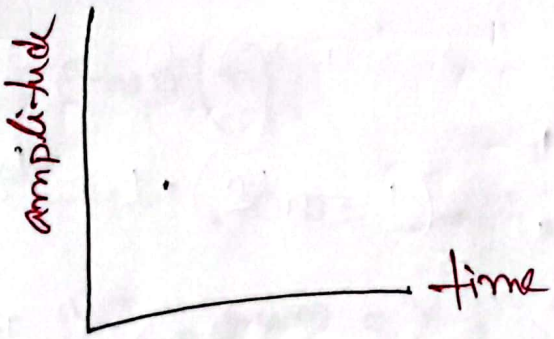
find the Matlab convolution sum;

here

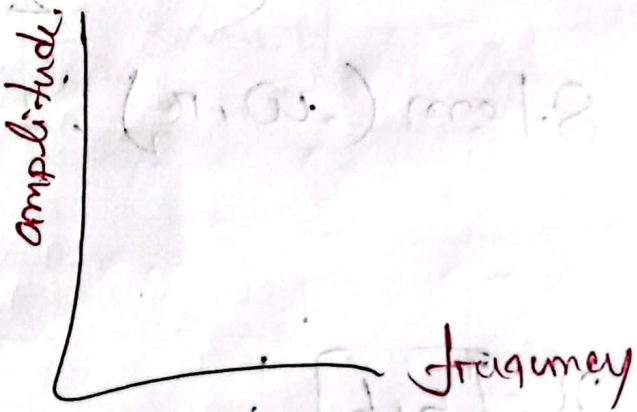
$x[n] = [3, 2]$;

$h[n] = [2, -2]$;

$\therefore y = conv(x, h)$;



time domain



Frequency domain.