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4ALIGEC046.
6B - 26/5/2020

DSP

Fourier transform derivatives, laplace transform, z transform

* The fourier transform

$$f(x):[-L,L] \to C$$

we have ortogoneal ~~exp~~

$$\& \ f(x) = \sum_{n=-\infty}^{\infty} C_n e^{-n\pi x/L},$$

$$C_n = \frac{1}{2L} \int_{-L}^{L} f(y) e^{-\pi y/L} dy \quad (1)$$

Now lets take limit $\to \infty$

~~Forall~~ setting $k_n = n\pi/L$ &

$\Delta k = \pi/L$ & (5)

we can write as,

$$f(x) = \frac{1}{2\pi} \sum_{n=-\infty}^{\infty} \left(\int_{-L}^{L} f(y) e^{-k_n y} dy \right)$$

* Fourier transform convolutions:

The inverse transform of a product of function is not the product of transform defined as,

$$(f * g)(x) = \int_{-\infty}^{\infty} f(x-y)\, g(y)\, dy$$

using the defination, fourier transform of this is,

$$(f * g)^{\wedge} = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} f(x-y)\, g(y)\, e^{-ikx}\, dx$$

using the change of variable $z = x-y$ this becomes,

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} f(x)\, g(y)\, e^{ik(y+z)}\, dy\, dz.$$

$$= \left(\int_{-\infty}^{\infty} f(z) e^{-ikz}\, dz\right) \left(\int_{-\infty}^{\infty} g(y) e^{-iky}\, dy\right)$$

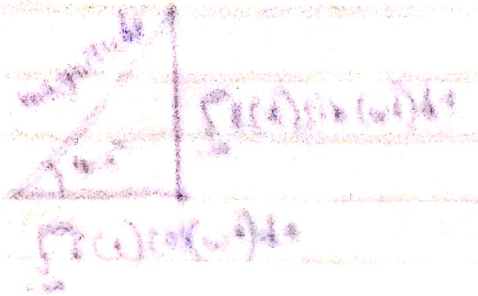
$$= \hat{f}(k)\, g'(k)$$

* The intension behind fourier & laplace transforms,

$$f(w) = \int_{-\infty}^{\infty} f(t)\, e^{-jwt}\, dt$$

$$e^{-jwt} = \cos(wt) - i\sin(wt)$$

$$F(w) = \int_{-\infty}^{\infty} f(t) \cos(wt)\, dt - i \int_{-\infty}^{\infty} f(t) \sin(wt)\, dt$$



* Laplace transform: first order eqn,

$$F(s) = \int_0^\infty f(t)e^{-st}\,dt$$

$$F(s) = \int_0^\infty e^{at}e^{-st}\,dt$$

$$= \left[\frac{e^{(a-s)t}}{a-s}\right] = \frac{1}{(s-a)}$$

$$\frac{dy}{dt} - ay = 0$$

$$\int_0^\infty \frac{dy}{dt}e^{-st}\,dt = \int_0^\infty y(t)\,(-se^{-st}\,dt) + \left[ye^{-st}\right]_0^\infty$$

$$= sy(s) - y(0)$$

Transform of dy/dt.

$$sy(s) - y(0) - a\,y(s) = 0$$

$$y(s) = \frac{y(0)}{s-a} \qquad \frac{\text{Inv}}{\text{LT}} \qquad y(t) = y(0)e^{at}$$

$$y(t) = y(0)e^{at} \Rightarrow \boxed{\frac{e^{ct} - e^{at}}{c-a}}$$

26/5/2020

Python report

Day 7

Application 4:- Build a personal website with python & flask

-> Building website:-
first create a python file & then write the code in that file.

```
from flask import flask
app = flask (_name)
@ app.create ('/')
def name ( ):
        return "website content goes here!"
if _name_ = "_main_"
        app.run (debug.true)
```

```
-> from flask import flask, sender_templets
app = Flash (_name)
@ app.route ('/')
def name ( ):
        return render_templeate ("name.html")

@ app.route ('/about')
def about( ):
        return sender templeate ( "about.html")

if _name_ ="main_"
        app.run (debug.drue)
```

```
<!DOCTYPE html>
<html>
   <body>
      <header>
        <div class="contance">
        <nl class =meni">
        <li> <a href="{{url_for (about')}}">about
        </ul>
       <:/nov>"</strong>
       <: /div>
        <:/header>
          <div class= "contaner">
             {% block content%}
            {%endblock%}
      <\div>
        </body>
<html>.
```