Results
Show that 
$$0L(t \operatorname{Sinat}) = \frac{2aS}{(S^2 + a^2)^2}$$

(a)  $L(t \operatorname{cosat}) = \frac{S^2 - a^2}{(S^2 + a^2)^2}$ 

We know  $L(t) = \frac{1}{S^2}$ 

Now  $L(t e^{iat}) = \frac{1}{(S - ia)^2} = \frac{(S + ia)^2}{(S - ia)^3(S + ia)^2}$ 

$$= \frac{S^2 + 2 ias - a^2}{(S^2 + a^2)^2}$$

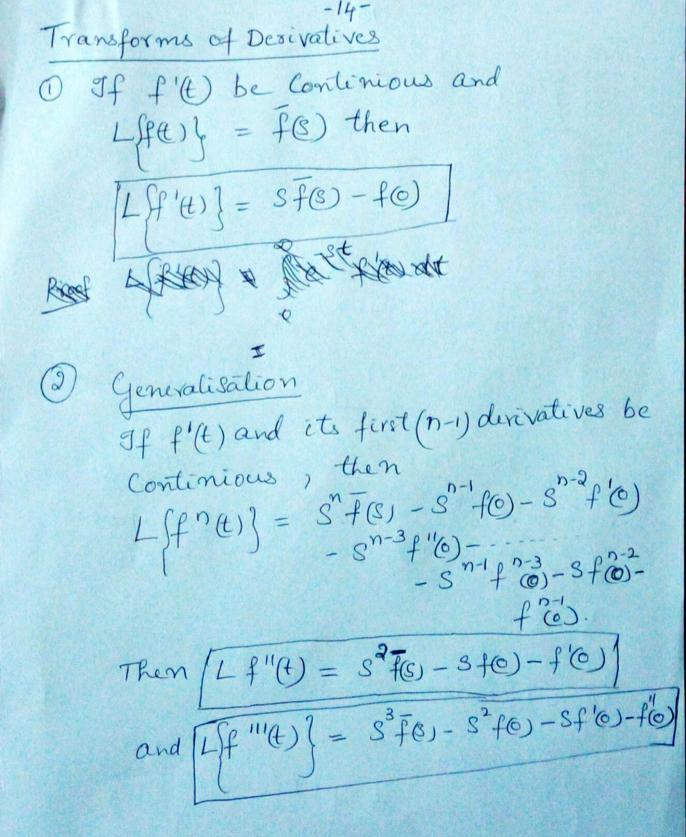
$$= \frac{S^2 - a^2 + i 2as}{(S^2 + a^2)^2}$$

[Now  $e^{iat} = \operatorname{cosat} + i \operatorname{sinat}$ ]

$$L(t \operatorname{cosat} + i \operatorname{sinat}) = \frac{S^2 - a^2 + i 2as}{(S^2 + a^2)^2}$$

$$L(t \operatorname{cosat}) = \frac{S^2 - a^2}{(S^2 + a^2)^2}$$

$$L(t \operatorname{cosat}) = \frac{2as}{(S^2 + a^2)^2}$$



Transforms of Intigrals

If 
$$L(t) = L(t)$$
, then

Let  $L(t) = L(t)$ , then

Multiplication by  $t^n$ 

If  $L(t) = L(t)$  then

Let  $L(t) = L(t)$  then

Let  $L(t) = L(t)$  then

Problems Find the Laplace transform of the senst  $L(t) = L(t)$  to  $L(t)$  to

$$\frac{-16^{-}}{ds^{2}} \frac{d^{2}}{ds^{2}} \left( \frac{\alpha}{s^{2} + \alpha^{2}} \right) = \frac{d^{2}}{ds^{2}} \left( \frac{\alpha}{s^{2} + \alpha^{2}} \right)$$

$$= \frac{d(s^{2} + \alpha^{2}) \cdot 0 - \alpha \cdot 28}{ds}$$

$$= \frac{d}{ds} \left( \frac{-2\alpha s}{(s^{2} + \alpha^{2})^{2}} \right)$$

$$= \left( \frac{s^{2} + \alpha^{2}}{s^{2}} \right)^{\frac{\alpha}{2}} \cdot 2\alpha + 2\alpha s \cdot 2(s^{2} + \alpha^{2}) \cdot 2s$$

$$= \left( \frac{s^{2} + \alpha^{2}}{s^{2}} \right)^{\frac{\alpha}{2}} \cdot 2\alpha + 8\alpha s^{2}$$

$$= \left( \frac{s^{2} + \alpha^{2}}{s^{2}} \right)^{\frac{\alpha}{2}}$$

$$= \left( \frac{s^{2} + \alpha^{2}}{s^{2}} \right)^{\frac{\alpha}{$$

Now L(t sinst) = (-1)' 
$$\frac{d}{ds} \left(\frac{3}{s^2+9}\right)$$

=  $-1 \left[ (s^2+9) \cdot o - 3 \cdot 2s \right]$ 

\*

( $s^2+9$ )?

=  $\frac{6s}{(s^2+9)^2}$ 

OR

L( $e^{-t}$  sinst) =  $\frac{3}{s^2+9}$  =  $f(s)$  and we first shiptography.

L( $e^{-t}$  sinst) =  $\frac{3}{(s+1)^2+9}$  =  $f(s)$ 

Now L( $f(s)$  =  $f$