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DEPARTMENT OF MATHEMATICS

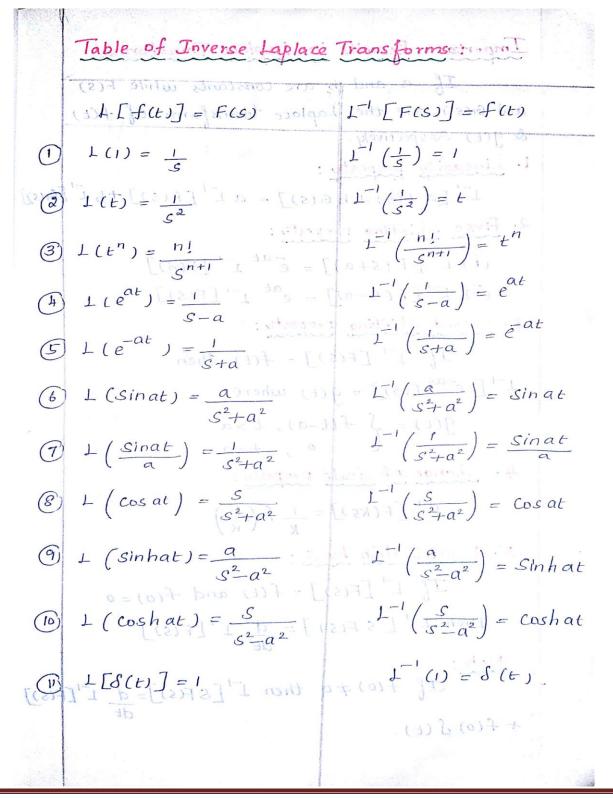
If the Laplace transform of fct) is F(s) i.e., L[f(t)] = F(s). Then f(t) is called an inverse Laplace transform of F(s) and is written as $f(t) = \int [F(s)] where \int is called$ the inverse Laplace transform Operator.





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Important Results in Laplace Transforms: If a and b are constants while F(s) and GICS) are the Laplace transform of f(t) & g(t) respectively. 1. Linearity property : $L'[a F(s) + b G(s)] = a L'[F(s)] + b L'[G_{B}]$ 2. First Shifting property: (i) $\Gamma' [F(s+\alpha)] = \overline{e}^{\alpha t} \Gamma' [F(s)]$ (ii) $L^{-1}[F(s-a)] = e^{at} L^{-1}[F(s)]$ 3. Second Shifting property: If I' [F(S)] = f(t) then $\int \frac{1}{12} \left[e^{-\alpha s} F(s) \right] = g(t) \quad \text{where} \quad f(s) = \int \frac{1}{12} \left[e^{-\alpha s} F(s) \right] = \frac{1}{12} \left[e^{-\alpha s} F(s) \right] =$ $g(t) = \int f(t-a), t > a$ o, t > a4. Change of Scale property: $L^{-1}\left[F(ks)\right] = \frac{1}{k}f\left(\frac{t}{k}\right)$ 5. Multiplication by S : If L'[F(s)] = f(t) and f(o) = 0then $L^{-1}[SF(S)] = \frac{d}{dL}L^{-1}[F(S)]$ Note: If $f(0) \neq 0$ then $I'[SF(S)] = \frac{d}{dt} I'[F(S)]$ $+ f(0) \delta(t)$.





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: analdar] Problem Identification: If $L^{-1}\left[\frac{S}{\text{Pruadratic equation}}\right]$ then use sesuit 5. If $L^{-1} \begin{bmatrix} 5 \\ Linear equation \end{bmatrix}$ then we use the above note. 6. Division by 5 : $L^{-1}\left[\frac{F(s)}{2}\right] = \int L^{-1}[F(s)] dt$ 7. Inverse Laplace transform of derivatives : If I'[F(s)] = f(t) then I'[F'(s)] = -t I[F(s)]Problem Identification: $I_{f}^{-1} \left[\frac{S + any \pm erm}{(\operatorname{Auadratic eqn})^{2}} \right] \pm hen we use the$ above gresult. 8. Note: If [F(s)] = f(t) then L'[F(s)] = 0 $-\frac{1}{F} \frac{\Gamma'}{\Gamma} \int \frac{d}{dc} F(s) \int \frac{d}{dc}$ Problem Identification: If I' [log function or cot function or tan fri J then we use the above result. $=\frac{3}{9} \frac{1}{5^{2}} \frac{9}{(5)^{2}} - \frac{1}{3} \frac{1}{5^{2}} \frac{5}{(5)^{2}} \frac{9}{5}$ $= \frac{2}{9} \cosh \frac{5}{3} t - \frac{1}{3} \sinh \frac{5}{3} t$