INVERSE LAPLACE TRANSFORM

Defn: If the Laplace Transform of $f(t)$ is $F(s)$ (ie) $L[f(t)] = F(s)$ Then $f(t)$ is called an inverse Laplace Transform of $F(s)$ and is written as $f(t) = L^{-1}[F(s)]$ where L^{-1} is called the inverse Laplace transformation operator.

Table of ILT:

$L[f(t)] = F(s)$ $\qquad$ $L^{-1}[F(s)] = f(t)$

1) $L[1] = \frac{1}{s} \Rightarrow L^{-1}\left[\frac{1}{s}\right] = 1$

2) $L[t] = \frac{1}{s^2} \Rightarrow L^{-1}\left[\frac{1}{s^2}\right] = t$

3) $L[t^n] = \frac{n!}{s^{n+1}} \Rightarrow L^{-1}\left[\frac{n!}{s^{n+1}}\right] = t^n$

4) $L[e^{at}] = \frac{1}{s-a} \Rightarrow L^{-1}\left[\frac{1}{s-a}\right] = e^{at}$

5) $L[e^{-at}] = \frac{1}{s+a} \Rightarrow L^{-1}\left[\frac{1}{s+a}\right] = e^{-at}$

6) $L[\sin at] = \frac{a}{s^2+a^2} \Rightarrow L^{-1}\left[\frac{a}{s^2+a^2}\right] = \sin at$

7) $L\left[\frac{\sin at}{a}\right] = \frac{1}{s^2+a^2} \Rightarrow L^{-1}\left[\frac{1}{s^2+a^2}\right] = \frac{\sin at}{a}$

8) $L[\cos at] = \frac{s}{s^2+a^2} \Rightarrow L^{-1}\left[\frac{s}{s^2+a^2}\right] = \cos at$

9) $L[\sinh at] = \frac{a}{s^2-a^2} \Rightarrow L^{-1}\left[\frac{a}{s^2-a^2}\right] = \sinh at$

10) $L[\cosh at] = \frac{s}{s^2-a^2} \Rightarrow L^{-1}\left[\frac{s}{s^2-a^2}\right] = \cosh at$

11) $L[\delta(t)] = 1 \Rightarrow L^{-1}[1] = \delta(t)$