



7.1: The Laplace Transform

Supplemental Instruction
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Course: Math 267

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1. Use the definition of Laplace Transform to find $\mathcal{L}\{f(t)\}$.

a. $f(t) = \begin{cases} -1 & 0 \leq t < 1 \\ 1 & t \geq 1 \end{cases}$

b. $f(t) = \begin{cases} t & 0 \leq t < 1 \\ 1 & t \geq 1 \end{cases}$

c. $f(t) = \begin{cases} \sin t & 0 \leq t < \pi \\ 0 & t \geq \pi \end{cases}$



2. Use the following table to find $\mathcal{L}\{f(t)\}$.

$\mathcal{L}\{1\} = \frac{1}{s}$	
$\mathcal{L}\{t^n\} = \frac{n!}{s^{n+1}}, n = 1, 2, 3, \dots$	$\mathcal{L}\{e^{at}\} = \frac{1}{s-a}$
$\mathcal{L}\{\sin kt\} = \frac{k}{s^2 + k^2}$	$\mathcal{L}\{\cos kt\} = \frac{s}{s^2 + k^2}$
$\mathcal{L}\{\sinh kt\} = \frac{k}{s^2 - k^2}$	$\mathcal{L}\{\cosh kt\} = \frac{s}{s^2 - k^2}$

a. $f(t) = 2t^4$

b. $f(t) = 4t - 10$

c. $f(t) = t^2 + 6t - 2$

d. $f(t) = 1 + e^{4t}$

e. $f(t) = 4t^2 - 5\sin 3t$