

**MAP2302: Differential Equations.**

<http://www.imathesis.com/map2302.html>

Practice 10.

**Topics:** 7.2, 7.3: The Laplace Transform: Definition, Properties.

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

Exercises 7.2 page 360:

Use the Definition of the Laplace Transform to determine the Laplace Transform of the given function:

1.  $t$                       3.  $e^{6t}$                       5.  $\cos 2t$                       7.  $e^{2t} \cos 3t$

9.  $f(x) = \begin{cases} 0 & 0 < t < 2 \\ t & t > 2 \end{cases}$

Use the Laplace Transform Table and the linearity of the Laplace Transform to determine the following transforms:

13.  $\mathcal{L}\{6e^{-3t} - t^2 + 2t - 8\}$

15.  $\mathcal{L}\{t^3 - te^t + e^{4t} \cos t\}$

17.  $\mathcal{L}\{e^{3t} \sin 6t - t^3 + e^t\}$

19.  $\mathcal{L}\{t^4 e^{5t} - e^t \cos \sqrt{7}t\}$

29. Which of the following functions are of exponential order?

a)  $t^3 \sin t$                       b)  $100e^{49t}$                       c)  $e^{t^3}$                       d)  $t \ln t$                       e)  $\cosh t^2$                       f)  $\frac{1}{t^2 + 1}$

7.3 page 365: Determine the Laplace Transform of the given function using a Table of Transforms and the properties of the Transform:

1.  $t^2 + e^t \sin(2t)$                       3.  $e^{-t} \cos(3t) + e^{6t} - 1$

5.  $2t^2 e^{-t} - t + \cos(4t)$                       7.  $(t - 1)^4$

9.  $e^{-t} t \sin(2t)$                       11.  $\cosh(bt)$

13.  $\sin^2 t$                       15.  $\cos^3 t$

17.  $\sin(2t) \sin(5t)$