Math 2C03: Table of Laplace Transforms:

Here $\mathscr{L}\{f(t)\} = F(s)$.

Section 7.1:

- $\mathscr{L}\{1\} = \dfrac{1}{s}$

- $\mathscr{L}\{t^n\} = \dfrac{n!}{s^{n+1}}$, $n = 1, 2, \ldots$

- $\mathscr{L}\{e^{at}\} = \dfrac{1}{s-a}$

- $\mathscr{L}\{\sin(kt)\} = \dfrac{k}{s^2 + k^2}$

- $\mathscr{L}\{\cos(kt)\} = \dfrac{s}{s^2 + k^2}$

- $\mathscr{L}\{\sinh(kt) = \dfrac{k}{s^2 - k^2}$

- $\mathscr{L}\{\cosh(kt)\} = \dfrac{s}{s^2 - k^2}$

Section 7.2:

- $\mathscr{L}\{f^{(n)}(t)\} = s^n F(s) - s^{n-1} f(0) - s^{n-2} f'(0) - \ldots - f^{(n-1)}(0)$

Section 7.3:

- $\mathscr{L}\{e^{at} f(t)\} = \mathscr{L}\{f(t)\}\,|_{s \to s-a} = F(s-a)$, where $a \in \mathbb{R}$
- $\mathscr{L}^{-1}\{F(s-a)\} = \mathscr{L}^{-1}\{F(s)\,|_{s \to s-a}\} = e^{at} f(t)$

- $\mathscr{L}\{f(t-a)\mathscr{U}(t-a)\} = e^{-as} F(s)$, where $a > 0$
- $\mathscr{L}^{-1}\{e^{-as} F(s)\} = f(t-a)\mathscr{U}(t-a)$, where $a > 0$
- $\mathscr{L}\{g(t)\mathscr{U}(t-a)\} = e^{-as}\mathscr{L}\{g(t+a)\}$, where $a > 0$

- $\mathscr{L}\{\mathscr{U}(t-a)\} = \dfrac{e^{-as}}{s}$, where $a > 0$

Section 7.4:

- $\mathscr{L}\{t^n f(t)\} = (-1)^n \frac{d^n}{ds^n} F(s)$, $n = 1, 2, \ldots$
- $\mathscr{L}\{f * g\} = \mathscr{L}\{f(t)\}\mathscr{L}\{g(t)\} = F(s)G(s)$

Section 7.5:

- $\mathscr{L}\{\delta(t - t_0)\} = e^{-st_0}$, for $t_0 > 0$