

AIDE-MÉMOIRE EXAMEN 3 MAT-2900

$$\begin{array}{l|l}
 \cos^2 x + \sin^2 x = 1 & \cos(a \pm b) = \cos a \cos b \mp \sin a \sin b \\
 \cos 2x = 2 \cos^2 x - 1 & \sin(a \pm b) = \sin a \cos b \pm \cos a \sin b \\
 \sin 2x = 2 \sin x \cos x & 2 \sin a \sin b = \cos(a - b) - \cos(a + b) \\
 2 \sin a \cos b = \sin(a - b) + \sin(a + b) & 2 \cos a \cos b = \cos(a - b) + \cos(a + b) \\
 \cos n\pi = (-1)^n, \cos \frac{(2n-1)\pi}{2} = 0, \sin n\pi = 0, \sin \frac{(2n-1)\pi}{2} = (-1)^{n+1} \quad n \in \mathbb{N} &
 \end{array}$$

$$\begin{array}{l|l|l|l}
 (x^n)' = nx^{n-1} & (\sin x)' = \cos x & \int \sin(ax) dx = -\frac{1}{a} \cos(ax) & \int x \sin(ax) dx = -\frac{x \cos ax}{a} + \frac{\sin ax}{a^2} \\
 (\ln x)' = \frac{1}{x} & (\cos x)' = -\sin x & \int \cos(ax) dx = \frac{1}{a} \sin(ax) & \int x \cos(ax) dx = \frac{x \sin ax}{a} + \frac{\cos ax}{a^2}
 \end{array}$$

$$\int u(x)v'(x) dx = u(x)v(x) - \int u'(x)v(x) dx$$

0	$f(t)$	$\mathcal{L}(f) = F(s) = \int_0^{\infty} f(t)e^{-st} dt$
1	$c_1 f_1(t) + c_2 f_2(t)$	$c_1 F_1(s) + c_2 F_2(s)$
2	$f'(t)$	$sF(s) - f(0)$
3	$f''(t)$	$s^2 F(s) - sf(0) - f'(0)$
4	$f^{(n)}(t), n = 0, 1, 2, \dots$	$s^n F(s) - s^{n-1} f(0) - s^{n-2} f'(0) - \dots - f^{(n-1)}(0)$
5	$\int_0^t f(\tau) d\tau$	$\frac{1}{s} F(s)$
6	$e^{at} f(t)$	$F(s - a)$
7	$u(t - a)f(t - a)$	$e^{-as} F(s)$
8	$tf(t)$	$-F'(s)$
9	$t^2 f(t)$	$F''(s)$
10	$t^n f(t), n = 0, 1, 2, \dots$	$(-1)^n F^{(n)}(s)$
11	$\frac{1}{t} f(t)$	$\int_s^{\infty} F(\sigma) d\sigma$
12	$f(t) * g(t) = \int_0^t f(t - \tau)g(\tau) d\tau$	$F(s)G(s)$
13	$f(ct)$	$\frac{1}{c} F\left(\frac{s}{c}\right)$

$$u(t-a) = \begin{cases} 0 & t \leq a \\ 1 & t \geq a \end{cases}, \quad \sinh t = \frac{e^t - e^{-t}}{2}, \quad \cosh t = \frac{e^t + e^{-t}}{2}$$

0	$f(t)$	$\mathcal{L}(f) = F(s) = \int_0^{\infty} f(t)e^{-st} dt$
1	1	s^{-1}
2	t	s^{-2}
3	$t^n, n = 0, 1, 2, \dots$	$n!s^{-(n+1)}$
4	\sqrt{t}	$\frac{1}{2}\sqrt{\pi}s^{-3/2}$
5	$\frac{1}{\sqrt{t}}$	$\sqrt{\pi/s}$
6	$t^a, a > 0$	$\Gamma(a+1)s^{-(a+1)}, \Gamma(a+1) = \int_0^{\infty} e^{-t}t^a dt$
7	e^{at}	$\frac{1}{s-a}$
8	$t^n e^{at}$	$\frac{n!}{(s-a)^{n+1}}$
9	$t^b e^{at}, b > 0$	$\frac{\Gamma(b+1)}{(s-a)^{b+1}}$
10	$\frac{1}{a-b}(e^{at} - e^{bt}), a \neq b$	$\frac{1}{(s-a)(s-b)}$
11	$\frac{1}{a-b}(ae^{at} - be^{bt}), a \neq b$	$\frac{s}{(s-a)(s-b)}$
12	$\sin(at)$	$\frac{a}{s^2 + a^2}$
13	$\cos(at)$	$\frac{s}{s^2 + a^2}$
14	$\sinh(at)$	$\frac{a}{s^2 - a^2}$
15	$\cosh(at)$	$\frac{s}{s^2 - a^2}$
16	$u(t-a), a \geq 0$	$\frac{e^{-as}}{s}$
17	$\delta(t-a) = \delta_a, a \geq 0$	e^{-as}
18	$\frac{1}{t} \sin(at)$	$\arctan \frac{a}{s}$
19	$\frac{e^t - 1}{t}$	$\ln \frac{s}{s-1}$