E Gaviot 1991

TABLEAU DES PROPRIETES GENERALES DE LA TRANSFORMATION DE LAPLACE

	$f(s)$	$F(t)$
32.3	$a f_1(s) + b f_2(s)$	$a F_1(t) + b F_2(t)$
32.4	$f(s/a)$	$a F(at)$
32.5	$f(s-a)$	$e^{at} F(t)$
32.6	$e^{-as} f(s)$	$\mathcal{U}(t-a) = \begin{cases} F(t-a) & t > a \\ 0 & t < a \end{cases}$
32.7	$s f(s) - F(0)$	$F'(t)$
32.8	$s^2 f(s) - s F(0) - F'(0)$	$F''(t)$
32.9	$s^n f(s) - s^{n-1} F(0) - s^{n-2} F'(0) - \cdots - F^{(n-1)}(0)$	$F^{(n)}(t)$
32.10	$f'(s)$	$-t F(t)$
32.11	$f''(s)$	$t^2 F(t)$
32.12	$f^{(n)}(s)$	$(-1)^n t^n F(t)$
32.13	$\dfrac{f(s)}{s}$	$\displaystyle\int_0^t F(u)\, du$
32.14	$\dfrac{f(s)}{s^n}$	$\displaystyle\int_0^t \cdots \int_0^t F(u)\, du^n = \int_0^t \frac{(t-u)^{n-1}}{(n-1)!} F(u)\, du$
32.15	$f(s)\, g(s)$	$\displaystyle\int_0^t F(u)\, G(t-u)\, du$

	$f(s)$	$F(t)$
32.16	$\int_s^\infty f(u)\,du$	$\frac{F(t)}{t}$
32.17	$\frac{1}{1-e^{-sT}}\int_0^T e^{-su}F(u)\,du$	$F(t) = F(t+T)$
32.18	$\frac{f(\sqrt{s})}{s}$	$\frac{1}{\sqrt{\pi t}}\int_0^\infty e^{-u^2/4t}F(u)\,du$
32.19	$\frac{1}{s}f(1/s)$	$\int_0^\infty J_0(2\sqrt{ut})\,F(u)\,du$
32.20	$\frac{1}{s^{n+1}}f(1/s)$	$t^{n/2}\int_0^\infty u^{-n/2}J_n(2\sqrt{ut})\,F(u)\,du$
32.21	$\frac{f(s+1/s)}{s^2+1}$	$\int_0^t J_0(2\sqrt{u(t-u)})\,F(u)\,du$
32.22	$\frac{1}{2\sqrt{\pi}}\int_0^\infty u^{-3/2}e^{-s^2/4u}f(u)\,du$	$F(t^2)$
32.23	$\frac{f(\ln s)}{s\ln s}$	$\int_0^\infty \frac{t^u F(u)}{\Gamma(u+1)}\,du$
32.24	$\frac{P(s)}{Q(s)}$ $P(s)$ = Polynôme de degré inférieur à n, $Q(s) = (s-\alpha_1)(s-\alpha_2)\cdots(s-\alpha_n)$ où $\alpha_1, \alpha_2, \ldots, \alpha_n$ sont distinctes.	$\sum_{k=1}^{n}\frac{P(\alpha_k)}{Q'(\alpha_k)}e^{\alpha_k t}$

TABLEAU DE TRANSFORMEES DE LAPLACE PARTICULIERES

	$f(s)$	$F(t)$
32.25	$\frac{1}{s}$	1
32.26	$\frac{1}{s^2}$	t
32.27	$\frac{1}{s^n}$ $\quad n = 1, 2, 3, \ldots$	$\frac{t^{n-1}}{(n-1)!}$, $\quad 0! = 1$
32.28	$\frac{1}{s^n}$ $\quad n > 0$	$\frac{t^{n-1}}{\Gamma(n)}$
32.29	$\frac{1}{s-a}$	e^{at}
32.30	$\frac{1}{(s-a)^n}$ $\quad n = 1, 2, 3, \ldots$	$\frac{t^{n-1}\, e^{at}}{(n-1)!}$, $\quad 0! = 1$
32.31	$\frac{1}{(s-a)^n}$ $\quad n > 0$	$\frac{t^{n-1}\, e^{at}}{\Gamma(n)}$
32.32	$\frac{1}{s^2 + a^2}$	$\frac{\sin at}{a}$
32.33	$\frac{s}{s^2 + a^2}$	$\cos at$
32.34	$\frac{1}{(s-b)^2 + a^2}$	$\frac{e^{bt} \sin at}{a}$
32.35	$\frac{s-b}{(s-b)^2 + a^2}$	$e^{bt} \cos at$
32.36	$\frac{1}{s^2 - a^2}$	$\left(\frac{\operatorname{sh} at}{a}\right)$
32.37	$\frac{s}{s^2 - a^2}$	$\operatorname{ch} at$
32.38	$\frac{1}{(s-b)^2 - a^2}$	$\frac{e^{bt} \operatorname{sh} at}{a}$

	$f(s)$	$F(t)$
32.39	$\dfrac{s-b}{(s-b)^2-a^2}$	$e^{bt}\,\mathrm{ch}\,at$
32.40	$\dfrac{1}{(s-a)(s-b)}\quad a\neq b$	$\dfrac{e^{bt}-e^{at}}{b-a}$
32.41	$\dfrac{s}{(s-a)(s-b)}\quad a\neq b$	$\dfrac{be^{bt}-ae^{at}}{b-a}$
32.42	$\dfrac{1}{(s^2+a^2)^2}$	$\dfrac{\sin at-at\cos at}{2a^3}$
32.43	$\dfrac{s}{(s^2+a^2)^2}$	$\dfrac{t\sin at}{2a}$
32.44	$\dfrac{s^2}{(s^2+a^2)^2}$	$\dfrac{\sin at+at\cos at}{2a}$
32.45	$\dfrac{s^3}{(s^2+a^2)^2}$	$\cos at-\frac{1}{2}at\sin at$
32.46	$\dfrac{s^2-a^2}{(s^2+a^2)^2}$	$t\cos at$
32.47	$\dfrac{1}{(s^2-a^2)^2}$	$\dfrac{at\,\mathrm{ch}\,at-\mathrm{sh}\,at}{2a^3}$
32.48	$\dfrac{s}{(s^2-a^2)^2}$	$\dfrac{t\,\mathrm{sh}\,at}{2a}$
32.49	$\dfrac{s^2}{(s^2-a^2)^2}$	$\dfrac{\mathrm{sh}\,at+at\,\mathrm{ch}\,at}{2a}$
32.50	$\dfrac{s^3}{(s^2-a^2)^2}$	$\mathrm{ch}\,at+\frac{1}{2}at\,\mathrm{sh}\,at$
32.51	$\dfrac{s^2+a^2}{(s^2-a^2)^2}$	$t\,\mathrm{ch}\,at$
32.52	$\dfrac{1}{(s^2+a^2)^3}$	$\dfrac{(3-a^2t^2)\sin at-3at\cos at}{8a^5}$
32.53	$\dfrac{s}{(s^2+a^2)^3}$	$\dfrac{t\sin at-at^2\cos at}{8a^3}$
32.54	$\dfrac{s^2}{(s^2+a^2)^3}$	$\dfrac{(1+a^2t^2)\sin at-at\cos at}{8a^3}$
32.55	$\dfrac{s^3}{(s^2+a^2)^3}$	$\dfrac{3t\sin at+at^2\cos at}{8a}$

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	$f(s)$	$F(t)$
32.56	$\frac{s^4}{(s^2+a^2)^3}$	$\frac{(3-a^2t^2)\sin at + 5at\cos at}{8a}$
32.57	$\frac{s^5}{(s^2+a^2)^3}$	$\frac{(8-a^2t^2)\cos at - 7at\sin at}{8}$
32.58	$\frac{3s^2-a^2}{(s^2+a^2)^3}$	$\frac{t^2\sin at}{2a}$
32.59	$\frac{s^3-3a^2s}{(s^2+a^2)^3}$	$\frac{1}{2}t^2\cos at$
32.60	$\frac{s^4-6a^2s^2+a^4}{(s^2+a^2)^4}$	$\frac{1}{6}t^3\cos at$
32.61	$\frac{s^3-a^2s}{(s^2+a^2)^4}$	$\frac{t^3\sin at}{24a}$
32.62	$\frac{1}{(s^2-a^2)^3}$	$\frac{(3+a^2t^2\operatorname{sh} at - 3at\operatorname{ch} at}{8a^5}$
32.63	$\frac{s}{(s^2-a^2)^3}$	$\frac{at^2\operatorname{ch} at - t\operatorname{sh} at}{8a^3}$
32.64	$\frac{s^2}{(s^2-a^2)^3}$	$\frac{at\operatorname{ch} at + (a^2t^2-1)\operatorname{sh} at}{8a^3}$
32.65	$\frac{s^3}{(s^2-a^2)^3}$	$\frac{3t\operatorname{sh} at + at^2\operatorname{ch} at}{8a}$
32.66	$\frac{s^4}{(s^2-a^2)^3}$	$\frac{(3+a^2t^2)\operatorname{sh} at + 5at\operatorname{ch} at}{8a}$
32.67	$\frac{s^5}{(s^2-a^2)^3}$	$\frac{(8+a^2t^2)\operatorname{ch} at + 7at\operatorname{sh} at}{8}$
32.68	$\frac{3s^2+a^2}{(s^2-a^2)^3}$	$\frac{t^2\operatorname{sh} at}{2a}$
32.69	$\frac{s^3+3a^2s}{(s^2-a^2)^3}$	$\frac{1}{2}t^2\operatorname{ch} at$
32.70	$\frac{s^4+6a^2s^2+a^4}{(s^2-a^2)^4}$	$\frac{1}{6}t^3\operatorname{ch} at$
32.71	$\frac{s^3+a^2s}{(s^2-a^2)^4}$	$\frac{t^3\operatorname{sh} at}{24a}$
32.72	$\frac{1}{s^3+a^3}$	$\frac{e^{at/2}}{3a^2}\left\{\sqrt{3}\sin\frac{\sqrt{3}\,at}{2} - \cos\frac{\sqrt{3}\,at}{2} + e^{-3at/2}\right\}$

	$f(s)$	$F(t)$
32.73	$\frac{s}{s^3+a^3}$	$\frac{e^{at/2}}{3a}\left\{\cos\frac{\sqrt{3}\,at}{2}+\sqrt{3}\sin\frac{\sqrt{3}\,at}{2}-e^{-3at/2}\right\}$
32.74	$\frac{s^2}{s^3+a^3}$	$\frac{1}{3}\left(e^{-at}+2e^{at/2}\cos\frac{\sqrt{3}\,at}{2}\right)$
32.75	$\frac{1}{s^3-a^3}$	$\frac{e^{-at/2}}{3a^2}\left\{e^{3at/2}-\cos\frac{\sqrt{3}\,at}{2}-\sqrt{3}\sin\frac{\sqrt{3}\,at}{2}\right\}$
32.76	$\frac{s}{s^3-a^3}$	$\frac{e^{-at/2}}{3a}\left\{\sqrt{3}\sin\frac{\sqrt{3}\,at}{2}-\cos\frac{\sqrt{3}\,at}{2}+e^{3at/2}\right\}$
32.77	$\frac{s^2}{s^3-a^3}$	$\frac{1}{3}\left(e^{at}+2e^{-at/2}\cos\frac{\sqrt{3}\,at}{2}\right)$
32.78	$\frac{1}{s^4+4a^4}$	$\frac{1}{4a^3}(\sin at\ \mathrm{ch}\ at-\cos at\ \mathrm{sh}\ at)$
32.79	$\frac{s}{s^4+4a^4}$	$\frac{\sin at\ \mathrm{sh}\ at}{2a^2}$
32.80	$\frac{s^2}{s^4+4a^4}$	$\frac{1}{2a}(\sin at\ \mathrm{ch}\ at+\cos at\ \mathrm{sh}\ at)$
32.81	$\frac{s^3}{s^4+4a^4}$	$\cos at\ \mathrm{ch}\ at$
32.82	$\frac{1}{s^4-a^4}$	$\frac{1}{2a^3}(\mathrm{sh}\ at-\sin at)$
32.83	$\frac{s}{s^4-a^4}$	$\frac{1}{2a^2}(\mathrm{ch}\ at-\cos at)$
32.84	$\frac{s^2}{s^4-a^4}$	$\frac{1}{2a}(\mathrm{sh}\ at+\sin at)$
32.85	$\frac{s^3}{s^4-a^4}$	$\frac{1}{2}(\mathrm{ch}\ at+\cos at)$
32.86	$\frac{1}{\sqrt{s+a}+\sqrt{s+b}}$	$\frac{e^{-bt}-e^{-at}}{2(b-a)\sqrt{\pi t^3}}$
32.87	$\frac{1}{s\sqrt{s+a}}$	$\frac{\mathrm{erf}\sqrt{at}}{\sqrt{a}}$
32.88	$\frac{1}{\sqrt{s}\,(s-a)}$	$\frac{e^{at}\,\mathrm{erf}\sqrt{at}}{\sqrt{a}}$
32.89	$\frac{1}{\sqrt{s-a}+b}$	$e^{at}\left\{\frac{1}{\sqrt{\pi t}}-b\,e^{b^2t}\,\mathrm{erfc}\,(b\sqrt{t})\right\}$

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	$f(s)$	$F(t)$
32.90	$\dfrac{1}{\sqrt{s^2+a^2}}$	$J_0(at)$
32.91	$\dfrac{1}{\sqrt{s^2-a^2}}$	$I_0(at)$
32.92	$\dfrac{(\sqrt{s^2+a^2}-s)^n}{\sqrt{s^2+a^2}}$ $\quad n>-1$	$a^n J_n(at)$
32.93	$\dfrac{(s-\sqrt{s^2-a^2})^n}{\sqrt{s^2-a^2}}$ $\quad n>-1$	$a^n I_n(at)$
32.94	$\dfrac{e^{b(s-\sqrt{s^2+a^2})}}{\sqrt{s^2+a^2}}$	$J_0(a\sqrt{t(t+2b)})$
32.95	$\dfrac{e^{-b\sqrt{s^2+a^2}}}{\sqrt{s^2+a^2}}$	$\begin{cases} J_0(a\sqrt{t^2-b^2}) & t>b \\ 0 & t<b \end{cases}$
32.96	$\dfrac{1}{(s^2+a^2)^{3/2}}$	$\dfrac{tJ_1(at)}{a}$
32.97	$\dfrac{s}{(s^2+a^2)^{3/2}}$	$tJ_0(at)$
32.98	$\dfrac{s^2}{(s^2+a^2)^{3/2}}$	$J_0(at) - atJ_1(at)$
32.99	$\dfrac{1}{(s^2-a^2)^{3/2}}$	$\dfrac{tI_1(at)}{a}$
32.100	$\dfrac{s}{(s^2-a^2)^{3/2}}$	$tI_0(at)$
32.101	$\dfrac{s^2}{(s^2-a^2)^{3/2}}$	$I_0(at) + atI_1(at)$
32.102	$\dfrac{1}{s(e^s-1)} = \dfrac{e^{-s}}{s(1-e^{-s})}$ Voir aussi numéro 32.165	$F(t)=n,\ n \leqq t < n+1,\ n=0,1,2,\ldots$
32.103	$\dfrac{1}{s(e^s-r)} = \dfrac{e^{-s}}{s(1-re^{-s})}$	$F(t) = \sum_{k=1}^{[t]} r^k$ où $[t]$ = plus grand entier $\leqslant t$.
32.104	$\dfrac{e^s-1}{s(e^s-r)} = \dfrac{1-e^{-s}}{s(1-re^{-s})}$ Voir aussi numéro 32.167	$F(t)=r^n,\ n \leqq t < n+1,\ n=0,1,2,\ldots$
32.105	$\dfrac{e^{-a/s}}{\sqrt{s}}$	$\dfrac{\cos 2\sqrt{at}}{\sqrt{\pi t}}$

	$f(s)$	$F(t)$
32.106	$\frac{e^{-a/s}}{s^{3/2}}$	$\frac{\sin 2\sqrt{at}}{\sqrt{\pi a}}$
32.107	$\frac{e^{-a/s}}{s^{n+1}} \quad n > -1$	$\left(\frac{t}{a}\right)^{n/2} J_n(2\sqrt{at})$
32.108	$\frac{e^{-a\sqrt{s}}}{\sqrt{s}}$	$\frac{e^{-a^2/4t}}{\sqrt{\pi t}}$
32.109	$e^{-a\sqrt{s}}$	$\frac{a}{2\sqrt{\pi t^3}} e^{-a^2/4t}$
32.110	$\frac{1 - e^{-a\sqrt{s}}}{s}$	$\operatorname{erf}(a/2\sqrt{t})$
32.111	$\frac{e^{-a\sqrt{s}}}{s}$	$\operatorname{erfc}(a/2\sqrt{t})$
32.112	$\frac{e^{-a\sqrt{s}}}{\sqrt{s}(\sqrt{s}+b)}$	$e^{b(bt+a)} \operatorname{erfc}\left(b\sqrt{t} + \frac{a}{2\sqrt{t}}\right)$
32.113	$\frac{e^{-a/\sqrt{s}}}{s^{n+1}} \quad n > -1$	$\frac{1}{\sqrt{\pi t}\, a^{2n+1}} \int_0^\infty u^n e^{-u^2/4a^2 t} J_{2n}(2\sqrt{u})\, du$
32.114	$\ln\left(\frac{s+a}{s+b}\right)$	$\frac{e^{-bt} - e^{-at}}{t}$
32.115	$\frac{\ln[(s^2+a^2)/a^2]}{2s}$	$Ci(at)$
32.116	$\frac{\ln[(s+a)/a]}{s}$	$Ei(at)$
32.117	$-\frac{(\gamma + \ln s)}{s}$ γ = Constante d'Euler = 0,5772156 . . .	$\ln t$
32.118	$\ln\left(\frac{s^2+a^2}{s^2+b^2}\right)$	$\frac{2(\cos at - \cos bt)}{t}$
32.119	$\frac{\pi^2}{6s} + \frac{(\gamma + \ln s)^2}{s}$ γ = Constante d'Euler = 0,5772156 . . .	$\ln^2 t$
32.120	$\frac{\ln s}{s}$	$-(\ln t + \gamma)$ γ = Constante d'Euler = 0,5772156 . .
32.121	$\frac{\ln^2 s}{s}$	$(\ln t + \gamma)^2 - \frac{1}{6}\pi^2$ γ = Constante d'Euler = 0,5772156 . .

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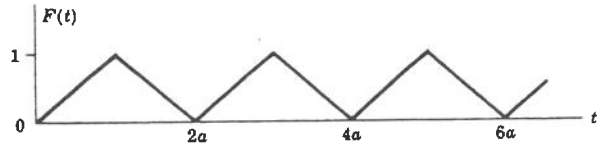
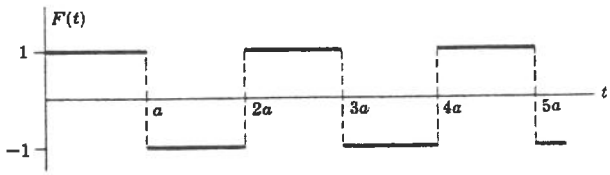
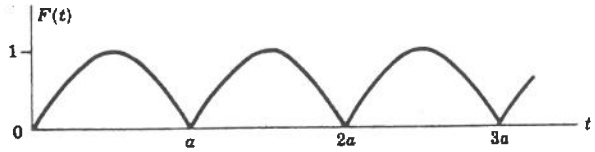
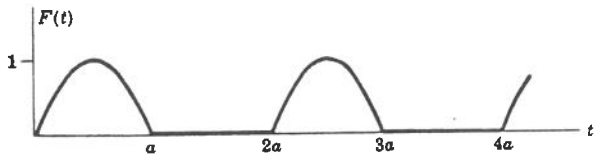
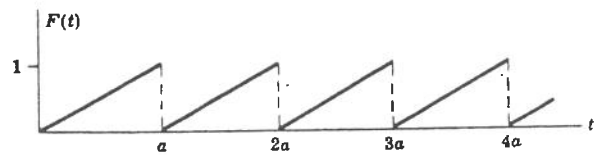
	$f(s)$	$F(t)$
32.122	$\dfrac{\Gamma'(n+1) - \Gamma(n+1)\ln s}{s^{n+1}} \qquad n > -1$	$t^n \ln t$
32.123	Arc tg (a/s)	$\dfrac{\sin at}{t}$
32.124	$\dfrac{\text{Arc tg}\,(a/s)}{s}$	$Si\,(at)$
32.125	$\dfrac{e^{a/s}}{\sqrt{s}}\ \text{erfc}\,(\sqrt{a/s}\,)$	$\dfrac{e^{-2\sqrt{at}}}{\sqrt{\pi t}}$
32.126	$e^{s^2/4a^2}\ \text{erfc}\,(s/2a)$	$\dfrac{2a}{\sqrt{\pi}}e^{-a^2t^2}$
32.127	$\dfrac{e^{s^2/4a^2}\ \text{erfc}\,(s/2a)}{s}$	$\text{erf}\,(at)$
32.128	$\dfrac{e^{as}\,\text{erfc}\,\sqrt{as}}{\sqrt{s}}$	$\dfrac{1}{\sqrt{\pi(t+a)}}$
32.129	$e^{as}\,Ei\,(as)$	$\dfrac{1}{t+a}$
32.130	$\dfrac{1}{a}\left[\cos as\left\{\dfrac{\pi}{2} - Si\,(as)\right\} - \sin as\ Ci\,(as)\right]$	$\dfrac{1}{t^2+a^2}$
32.131	$\sin as\left\{\dfrac{\pi}{2} - Si\,(as)\right\} + \cos as\ Ci\,(as)$	$\dfrac{t}{t^2+a^2}$
32.132	$\dfrac{\cos as\left\{\dfrac{\pi}{2} - Si\,(as)\right\} - \sin as\ Ci\,(as)}{s}$	$\text{Arc tg}\,(t/a)$
32.133	$\dfrac{\sin as\left\{\dfrac{\pi}{2} - Si\,(as)\right\} + \cos as\ Ci\,(as)}{s}$	$\dfrac{1}{2}\ln\left(\dfrac{t^2+a^2}{a^2}\right)$
32.134	$\left[\dfrac{\pi}{2} - Si\,(as)\right]^2 + Ci^2\,(as)$	$\dfrac{1}{t}\ln\left(\dfrac{t^2+a^2}{a^2}\right)$
32.135	0	$\mathcal{N}(t) =$ fonction nulle
32.136	1	$\delta(t) =$ fonction delta
32.137	e^{-as}	$\delta(t-a)$
32.138	$\dfrac{e^{-as}}{s}$ Voir aussi le numéro 32.163	$\mathcal{U}(t-a)$

	$f(s)$	$F(t)$
32.139	$\frac{\operatorname{sh} sx}{s \operatorname{sh} sa}$	$\frac{x}{a} + \frac{2}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^n}{n} \sin \frac{n\pi x}{a} \cos \frac{n\pi t}{a}$
32.140	$\frac{\operatorname{sh} sx}{s \operatorname{ch} sa}$	$\frac{4}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^n}{2n-1} \sin \frac{(2n-1)\pi x}{2a} \sin \frac{(2n-1)\pi t}{2a}$
32.141	$\frac{\operatorname{ch} sx}{s \operatorname{sh} as}$	$\frac{t}{a} + \frac{2}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^n}{n} \cos \frac{n\pi x}{a} \sin \frac{n\pi t}{a}$
32.142	$\frac{\operatorname{ch} sx}{s \operatorname{ch} sa}$	$1 + \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^n}{2n-1} \cos \frac{(2n-1)\pi x}{2a} \cos \frac{(2n-1)\pi t}{2a}$
32.143	$\frac{\operatorname{sh} sx}{s^2 \operatorname{sh} sa}$	$\frac{xt}{a} + \frac{2a}{\pi^2} \sum_{n=1}^{\infty} \frac{(-1)^n}{n^2} \sin \frac{n\pi x}{a} \sin \frac{n\pi t}{a}$
32.144	$\frac{\operatorname{sh} sx}{s^2 \operatorname{ch} sa}$	$x + \frac{8a}{\pi^2} \sum_{n=1}^{\infty} \frac{(-1)^n}{(2n-1)^2} \sin \frac{(2n-1)\pi x}{2a} \cos \frac{(2n-1)\pi t}{2a}$
32.145	$\frac{\operatorname{ch} sx}{s^2 \operatorname{sh} sa}$	$\frac{t^2}{2a} + \frac{2a}{\pi^2} \sum_{n=1}^{\infty} \frac{(-1)^n}{n^2} \cos \frac{n\pi x}{a} \left(1 - \cos \frac{n\pi t}{a}\right)$
32.146	$\frac{\operatorname{ch} sx}{s^3 \operatorname{ch} sa}$	$t + \frac{8a}{\pi^2} \sum_{n=1}^{\infty} \frac{(-1)^n}{(2n-1)^2} \cos \frac{(2n-1)\pi x}{2a} \sin \frac{(2n-1)\pi t}{2a}$
32.147	$\frac{\operatorname{ch} sx}{s^3 \operatorname{ch} sa}$	$\frac{1}{2}(t^2 + x^2 - a^2) - \frac{16a^2}{\pi^3} \sum_{n=1}^{\infty} \frac{(-1)^n}{(2n-1)^3} \cos \frac{(2n-1)\pi x}{2a} \cos \frac{(2n-1)\pi t}{2a}$
32.148	$\frac{\operatorname{sh} x\sqrt{s}}{\operatorname{sh} a\sqrt{s}}$	$\frac{2\pi}{a^2} \sum_{n=1}^{\infty} (-1)^n n\, e^{-n^2\pi^2 t/a^2} \sin \frac{n\pi x}{a}$
32.149	$\frac{\operatorname{ch} x\sqrt{s}}{\operatorname{ch} a\sqrt{s}}$	$\frac{\pi}{a^2} \sum_{n=1}^{\infty} (-1)^{n-1} (2n-1)\, e^{-(2n-1)^2\pi^2 t/4a^2} \cos \frac{(2n-1)\pi x}{2a}$
32.150	$\frac{\operatorname{sh} x\sqrt{s}}{\sqrt{s} \operatorname{ch} a\sqrt{s}}$	$\frac{2}{a} \sum_{n=1}^{\infty} (-1)^{n-1} e^{-(2n-1)^2\pi^2 t/4a^2} \sin \frac{(2n-1)\pi x}{2a}$
32.151	$\frac{\operatorname{ch} x\sqrt{s}}{\sqrt{s} \operatorname{sh} a\sqrt{s}}$	$\frac{1}{a} + \frac{2}{a} \sum_{n=1}^{\infty} (-1)^n e^{-n^2\pi^2 t/a^2} \cos \frac{n\pi x}{a}$
32.152	$\frac{\operatorname{sh} x\sqrt{s}}{s \operatorname{sh} a\sqrt{s}}$	$\frac{x}{a} + \frac{2}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^n}{n} e^{-n^2\pi^2 t/a^2} \sin \frac{n\pi x}{a}$
32.153	$\frac{\operatorname{ch} x\sqrt{s}}{s \operatorname{ch} a\sqrt{s}}$	$1 + \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^n}{2n-1} e^{-(2n-1)^2\pi^2 t/4a^2} \cos \frac{(2n-1)\pi x}{2a}$
32.154	$\frac{\operatorname{sh} x\sqrt{s}}{s^2 \operatorname{sh} a\sqrt{s}}$	$\frac{xt}{a} + \frac{2a^2}{\pi^3} \sum_{n=1}^{\infty} \frac{(-1)^n}{n^3} (1 - e^{-n^2\pi^2 t/a^2}) \sin \frac{n\pi x}{a}$
32.155	$\frac{\operatorname{ch} x\sqrt{s}}{s^2 \operatorname{ch} a\sqrt{s}}$	$\frac{1}{2}(x^2 - a^2) + t - \frac{16a^2}{\pi^3} \sum_{n=1}^{\infty} \frac{(-1)^n}{(2n-1)^3} e^{-(2n-1)^2\pi^2 t/4a^2} \cos \frac{(2n-1)\pi x}{2a}$

	$f(s)$	$F(t)$
32.156	$\dfrac{J_0(ix\sqrt{s})}{s\,J_0(ia\sqrt{s})}$	$1 - 2\sum_{n=1}^{\infty} \dfrac{e^{-\lambda_n^2 t/a^2}\, J_0(\lambda_n x/a)}{\lambda_n J_1(\lambda_n)}$ où $\lambda_1, \lambda_2, \ldots$ sont les racines positives de $J_0(\lambda) = 0$.
32.157	$\dfrac{J_0(ix\sqrt{s})}{s^2 J_0(ia\sqrt{s})}$	$\frac{1}{4}(x^2 - a^2) + t + 2a^2 \sum_{n=1}^{\infty} \dfrac{e^{-\lambda_n^2 t/a^2}\, J_0(\lambda_n x/a)}{\lambda_n^3 J_1(\lambda_n)}$ où $\lambda_1, \lambda_2, \ldots$ sont les racines positives de $J_0(\lambda) = 0$.
32.158	$\dfrac{1}{as^2}\ \text{th}\left(\dfrac{as}{2}\right)$	**Fonction en triangles**  Fig. 32-1
32.159	$\dfrac{1}{s}\ \text{th}\left(\dfrac{as}{2}\right)$	**Fonction en créneaux**  Fig. 32-2
32.160	$\dfrac{\pi a}{a^2 s^2 + \pi^2} \coth\left(\dfrac{as}{2}\right)$	**Fonction sinusoïdale rectifiée**  Fig. 32-3
32.161	$\dfrac{\pi a}{(a^2 s^2 + \pi^2)(1 - e^{-as})}$	**Fonction sinusoïdale rectifiée demi onde**  Fig. 32-4
32.162	$\dfrac{1}{as^2} - \dfrac{e^{-as}}{s(1 - e^{-as})}$	**Fonction en dent de scie**  Fig. 32-5

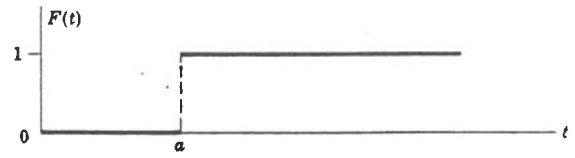
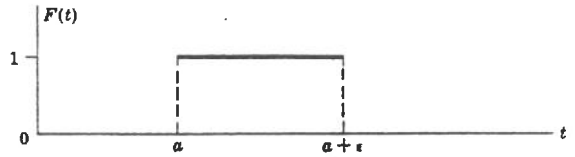
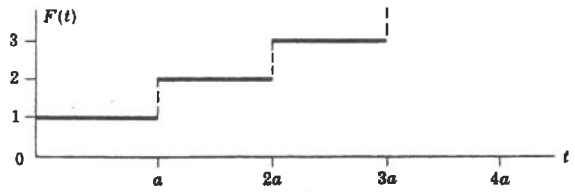
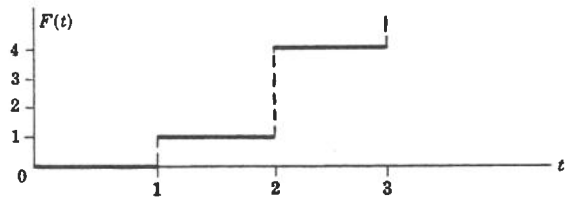
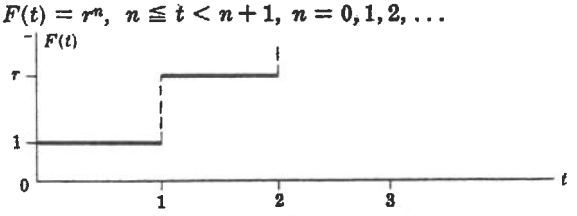
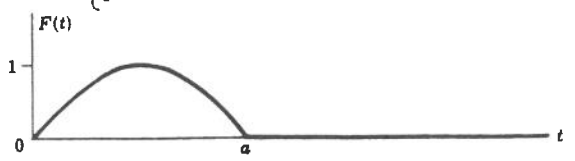
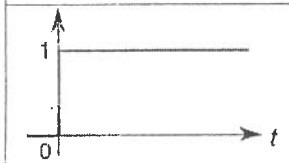
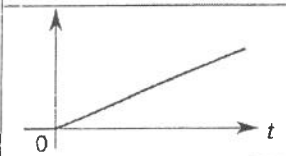
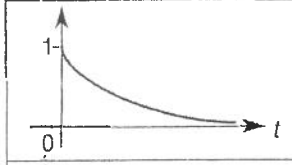
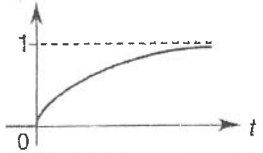
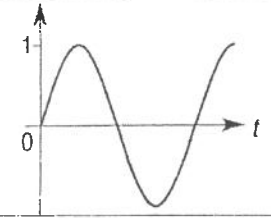
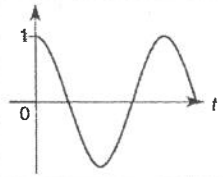
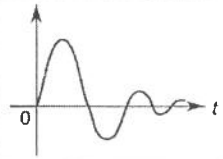
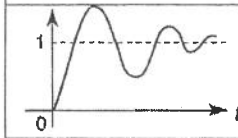
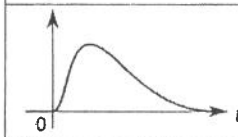
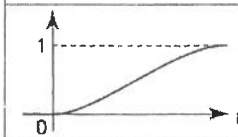
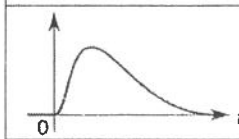
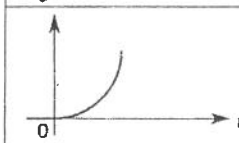
	$f(s)$	$F(t)$
32.163	$\frac{e^{-as}}{s}$ Voir aussi le numéro 32.138.	**Fonction unité de Heaviside** $\mathfrak{u}(t-a)$  **Fig. 32-6**
32.164	$\frac{e^{-as}(1-e^{-\epsilon s})}{s}$	**Fonction impulsion**  **Fig. 32-7**
32.165	$\frac{1}{s(1-e^{-as})}$ Voir aussi le numéro 32.102.	Fonction en escalier  **Fig. 32-8**
32.166	$\frac{e^{-s}+e^{-2s}}{s(1-e^{-s})^2}$	$F(t) = n^2,\ n \leqq t < n+1,\ n = 0, 1, 2, \ldots$  **Fig. 32-9**
32.167	$\frac{1-e^{-s}}{s(1-re^{-s})}$ Voir aussi le numéro 32.104.	$F(t) = r^n,\ n \leqq t < n+1,\ n = 0, 1, 2, \ldots$  **Fig. 32-10**
32.168	$\frac{\pi a(1+e^{-as})}{a^2s^2+\pi^2}$	$F(t) = \begin{cases} \sin(\pi t/a) & 0 \leqq t \leqq a \\ 0 & t > a \end{cases}$  **Fig. 32-11**

Table des Transformées de Laplace usuelles

	$f(t)$	$F(p)$
	$\delta(t)$	1
	$\Gamma(t)$	$\frac{1}{p}$
	at	$\frac{a}{p^2}$
	e^{-at}	$\frac{1}{p+a}$
	$1 - e^{-t/\tau}$	$\frac{1}{p(1+\tau p)}$
	$\sin \omega t$	$\frac{\omega}{p^2+\omega^2}$

	$f(t)$	$F(p)$
	$\cos \omega t$	$\frac{p}{p^2+\omega^2}$
	$\frac{\omega_0}{\sqrt{1-m^2}} e^{-m\omega_0 t} \sin(\omega_0 \sqrt{1-m^2}\, t)$	$\frac{1}{1+2m\frac{p}{\omega_0}+\left(\frac{p}{\omega_0}\right)^2}$ $m<1$
	$1 - \frac{e^{-m\omega_0 t}}{\sqrt{1-m^2}} \sin\left[\omega_0 \sqrt{1-m^2}\, t + \varphi\right]$ avec $\cos\varphi = m$	$\frac{1}{p\left(1+2m\frac{p}{\omega_0}+\frac{p^2}{\omega_0^2}\right)}$ $m<1$
	$\frac{1}{\tau_1-\tau_2}\left(e^{-t/\tau_1} - e^{-t/\tau_2}\right)$ $\tau_1 \neq \tau_2$	$\frac{1}{(1+\tau_1 p)(1+\tau_2 p)}$
	$1 - \frac{1}{\tau_1-\tau_2}\left(\tau_1 e^{-t/\tau_1} - \tau_2 e^{-t/\tau_2}\right)$ $\tau_1 \neq \tau_2$	$\frac{1}{p(1+\tau_1 p)(1+\tau_2 p)}$
	$\frac{1}{\tau^n} \times \frac{t^{n-1}}{(n-1)!} e^{-t/\tau}$ $n \geq 1$	$\frac{1}{(1+\tau p)^n}$
	$\frac{t^{n-1}}{(n-1)!}$ $n \geq 1$	$\frac{1}{p^n}$