



TABLE 15.1
Table of Laplace transforms

| $f(s)$ | $F(t)$ | $f(s)$ | $F(t)$ |
|------------------------------------------|---------------------------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| $\frac{1}{s}$ | 1 | $\frac{s}{s^2 - a^2}$ | $\cosh(at)$ |
| $\frac{1}{s^2}$ | t | $\frac{s}{s^2 + a^2}$ | $\cos(at)$ |
| $\frac{1}{s^n}$ $n = 1, 2, 3 \dots$ | $\frac{t^{n-1}}{(n-1)!}$ | $\frac{b}{(s+a)^2 + b^2}$ | $e^{-at} \sin(bt)$ |
| $\frac{1}{\sqrt{s}}$ | $\frac{1}{\sqrt{\pi t}}$ | | |
| $\frac{1}{s-a}$ | e^{at} | $\frac{s+a}{(s+a)^2 + b^2}$ | $e^{-at} \cos(bt)$ |
| $\frac{1}{(s-a)^2}$ | te^{at} | $\frac{1}{s(s^2 + a^2)}$ | $\frac{1}{a^2}(1 - \cos at)$ |
| $\frac{1}{(s-a)^n}$ $n = 1, 2, \dots$ | $\frac{t^{n-1}e^{at}}{(n-1)!}$ | $\frac{1}{s^2(s^2 + a^2)}$ | $\frac{1}{a^3}(at - \sin at)$ |
| $\frac{1}{(s-a)(s-b)}$ | $\frac{1}{a-b}(e^{at} - e^{bt})$ | $\frac{1}{(s^2 + a^2)^2}$ | $\frac{1}{2a^3}(\sin at - at \cos at)$ |
| $\frac{1}{(s-a)(s-b)(s-c)}$ | $\frac{[(b-c)e^{at} + (c-a)e^{bt} - (a-b)e^{ct}]}{(a-b)(b-c)(c-a)}$ | $\frac{s}{(s^2 + a^2)^2}$ | $\frac{t}{2a} \sin(at)$ |
| $\frac{s}{(s-a)(s-b)}$ | $\frac{1}{(a-b)}(ae^{at} - be^{bt})$ | $\frac{1}{(s+a)(s^2 + b^2)}$ | $\frac{1}{a^2 + b^2} [e^{-at} + \frac{\sqrt{a^2 + b^2}}{b} \sin(bt - \theta)]$ where $\Theta = \tan^{-1} \left(\frac{b}{a} \right)$ |
| $\frac{1}{s^2 + a^2}$ | $\frac{1}{a} \sin(at)$ | | |
| $\frac{1}{s^2 - a^2}$ | $\frac{1}{a} \sinh(at)$ | | |