TABLE 9.1 **Laplace Transforms** **Table #:**

	$f(t) = \mathcal{L}^{-1}\{F(s)\}$	$F(s) = \mathcal{L}\{f(t)\}$
1	1	$1/s$
2	e^{at}	$1/(s - a)$
3	$\sin(bt)$	$b/(s^2 + b^2)$
4	$\cos(bt)$	$s/(s^2 + b^2)$
5	$\sinh(bt)$	$b/(s^2 - b^2)$
6	$\cosh(bt)$	$s/(s^2 - b^2)$
7	t^n for $n = 1,2,...$	$(n!)/s^{n+1}$
8	$t^n e^{at}$ for $n = 1,2,...$	$(n!)/(s - a)^{n+1}$
9	$t \cdot \sin(bt)$	$(2 \cdot b \cdot s)/(s^2 + b^2)^2$
10	$t \cdot \cos(bt)$	$(s^2 - b^2)/(s^2 + b^2)^2$
11	$e^{-at} \cdot \sin(bt)$	$b/((s + a)^2 + b^2)$
12	$e^{-at} \cdot \cos(bt)$	$(s + a)/((s + a)^2 + b^2)$
13	$(\sin(bt) - bt \cdot \cos(bt))/(2 \cdot b^3)$	$1/(s^2 + b^2)^2$
14	$(t \cdot \sin(bt))/(2 \cdot b)$	$s/(s^2 + b^2)^2$
15	$u_a(t)$	e^{-as}/s
16	$u_a(t) \cdot f(t - a)$	$e^{-as} \cdot F(s)$
17	t^α , $\alpha > -1$	$\Gamma(\alpha + 1)/s^{\alpha+1}$, $s > 0$

Note: $\Gamma(x) = \int_0^\infty e^{-u} u^{x-1} du$ *for* $x > 0$ is the gamma function.

For $x > -1$, $\Gamma(x + 1) = x \cdot \Gamma(x)$, and $\Gamma(1) = 1$. Thus $\Gamma(n + 1) = n!$.