Laplace transforms

$$L\{e^{\alpha t}\} = \frac{1}{s-\alpha}$$

$$L\{1\} = \frac{1}{s}$$

$$L\{t^n\} = \frac{n!}{s^{n+1}} \quad (n \text{ a nonnegative integer})$$

$$L\{\cos\beta t\} = \frac{s}{s^2+\beta^2}$$

$$L\{\sin\beta t\} = \frac{\beta}{s^2+\beta^2}$$

$$L\{e^{\alpha t}\cos\beta t\} = \frac{s-\alpha}{(s-\alpha)^2+\beta^2}$$

$$L\{e^{\alpha t}\sin\beta t\} = \frac{\beta}{(s-\alpha)^2+\beta^2}$$

$$L\{u_c(t)\} = \frac{e^{-cs}}{s}$$ where u_c is the step function which "switches on" at $t = c$

$$L\{u_c(t)f(t-c)\} = e^{-cs}L\{f(t)\}$$

Other information you may need:

Fundamental solutions to heat equation boundary value problems with homogeneous boundary conditions:

$$\sin\left(\frac{n\pi x}{L}\right)\exp\left(-\frac{\alpha^2 n^2 \pi^2}{L^2}t\right),$$

for positive integer values of n.

$$\int x\cos(ax)dx = \frac{1}{a^2}\cos(ax) + \frac{x}{a}\sin(ax) + C$$

$$\int x\sin(ax)dx = \frac{1}{a^2}\sin(ax) - \frac{x}{a}\cos(ax) + C$$

In case the 2×2 matrix A has complex eigenvalues $r = \alpha + i\beta$ and $\bar{r} = \alpha - i\beta$, and $\xi = u + iv$ is an eigenvector corresponding to eigenvalue r, the general solution to the system $x' = Ax$ is

$$x(t) = e^{\alpha t}\left[c_1(u\cos\beta t - v\sin\beta t) + c_2(v\cos\beta t + u\sin\beta t)\right]$$