Formula Sheet

1) $L\{1\} = \dfrac{1}{s}$ $\qquad$ $L\{t^n\} = \dfrac{n!}{s^{n+1}}$ **, n is a positive integer**

2) $L\{\sin kt\} = \dfrac{k}{s^2 + k^2}$ $\qquad$ $L\{\cos kt\} = \dfrac{s}{s^2 + k^2}$

3) $L\{e^{at}\} = \dfrac{1}{s-a}$

4) $L\{e^{at} f(t)\} = F(s)\big|_{s \to s-a}$ $\qquad$ $L^{-1}\left\{F(s)\big|_{s \to s-a}\right\} = e^{at} f(t)$

5) $L\{g(t)U(t-a)\} = e^{-as} L\{g(t+a)\}$

$L^{-1}\{e^{-as} F(s)\} = f(t-a)U(t-a)$

6) $L\{U(t-a)\} = \dfrac{e^{-as}}{s}$ $\qquad$ $L^{-1}\{\dfrac{e^{-as}}{s}\} = U(t-a)$

7) $L\{f^{(n)}(t)\} = s^n F(s) - s^{n-1} f(0) - s^{n-2} f'(0) - .... - f^{(n-1)}(0)$

8) $L\{t^n f(t)\}(s) = (-1)^n \dfrac{d^n F(s)}{ds^n}$ $\qquad$ $L^{-1}\{\dfrac{d^n F(s)}{ds^n}\} = (-1)^n t^n f(t)$

9) $L\{f(t) * g(t)\} = F(s).G(s)$ $\qquad$ $f(t) * g(t) = \int_0^t f(\tau) g(t-\tau) d\tau$

10) $L\{\int_0^t f(\tau) d\tau\} = \dfrac{F(s)}{s}$ $\qquad$ $L^{-1}\{F(s).G(s)\} = f(t) * g(t)$

11) $L\{\delta(t)\} = 1$ $\qquad$ $L\{\delta(t-a)\} = e^{-as}$

12) **If** $f(t)$ **is periodic with period** T **then**

$$L\{f(t)\} = \frac{1}{1-e^{-Ts}} \int_0^T e^{-st} f(t) dt$$

13) $L\{f(t)\} = \int_0^\infty e^{-st} f(t) dt$