H FORMULA SHEET

1. $A \cdot 1(t)$	$\frac{A}{s}$
2. $\delta(t) \cdot 1(t)$	1
3. $t^n \cdot 1(t)$	$\frac{n!}{s^{n+1}}$
4. $e^{at} \cdot 1(t)$	$\frac{1}{s-a}$
5. $sin(\omega t) \cdot 1(t)$	$\frac{\omega}{s^2+\omega^2}$
6. $cos(\omega t) \cdot 1(t)$	$\frac{s}{s^2+\omega^2}$

1. Linearity	$a \cdot f(t) + b \cdot g(t)$	$a \cdot F(s) + b \cdot G(s)$
2. Frequency shift	$e^{-at} \cdot f(t)$	$F(s+a)$
3. Time shift	$f(t-a) \cdot 1(t-a)$	$e^{-as} \cdot F(s)$
4. Scaling	$f(at)$	$1/a\ F(s/a)$
5. Differentiation	$f^{(n)}(t)$	$s^n \cdot F(s) - s^{n-1} \cdot f(0) - s^{n-2} \cdot f'(0) - \ldots - s^0 \cdot f^{(n-1)}(0)$
6. Initial	$f(0) = \lim_{t \to 0} f(t)$	$f(0) = \lim_{s \to \infty} sF(s)$
7. Final	$f(\infty) = \lim_{t \to \infty} f(t)$	$f(\infty) = \lim_{s \to 0} sF(s)$

Physical properties of RLC circuit components

Components	Voltage – Current Relationship
Resistor	$U(t) = I(t)R$
Capacitor	$U(t) = \frac{1}{C}\int_0^t I(\tau)\, d\tau$
Inductor	$U(t) = L\frac{d\, I(t)}{d\, t}$

Transfer function delayed first order process

$$H_P(s) = \frac{K_P\ e^{-\tau_v s}}{\tau_P\, s + 1}$$

Figure H.1: The formula sheet