$$V_{\text{amplitude}} = \sqrt{2}\, V_{RMS} \tag{1}$$

$$A_V = \frac{V_{out}}{V_{in}} \tag{2}$$

$$A_V(\text{ideal}) = \frac{V_{out,\text{OC}}}{V_{in}} \tag{3}$$

$$V = IR \tag{4}$$

$$R_{Th} = R_N = \frac{V_{\text{OC}}}{I_{\text{SC}}} \tag{5}$$

$$\text{Gain (dB)} = 10 \log_{10} \frac{P_2}{P_1} \stackrel{*}{=} 20 \log_{10} \frac{V_2}{V_1} \tag{6}$$

$$Z_R = R \tag{7}$$

$$Z_C = (j\omega C)^{-1} \tag{8}$$

$$Z_L = j\omega L \tag{9}$$

$$\text{if } z = x + jy = re^{j\phi} \text{ then} \tag{10}$$

$$r = \sqrt{x^2 + y^2} \qquad \phi = \text{Tan}^{-1}\left(\frac{y}{x}\right) \tag{11}$$

$$x = r\cos\phi \qquad y = r\sin\phi \tag{12}$$

$$\text{Gain (closed-loop)} = \frac{A}{1 + AB} \tag{13}$$

$$f_{\text{3dB}} = (2\pi RC)^{-1} = (2\pi\tau)^{-1} \tag{14}$$

$$\text{Gain (non-inverting)} = \frac{R_1 + R_2}{R_2}\ , (R_1 \text{ connected to the output}) \tag{15}$$

$$\text{Gain (inverting)} = -\frac{R_1}{R_2}\ , (R_1 \text{ connected to the output}) \tag{16}$$

$$V_{out}(t) = -\frac{1}{RC}\int_0^t dt'\, V_{in}(t') + \text{constant} \tag{17}$$

$$V_{out} = -RC\,\frac{dV_{in}(t)}{dt} \tag{18}$$

$$V_{out} = -(V_1 + V_2)\frac{R_1}{R_2}\ , (R_1 \text{ connected to the output}) \tag{19}$$

$$V_{out} = -(V_1 - V_2)\frac{R_1}{R_2}\ , (R_1 \text{ connected to output and ground}) \tag{20}$$

$$\text{(Gain)(Bandwidth)} \sim \text{(unity gain bandwidth)} \tag{21}$$