For initial ECG amplifier, $V_o = \left(\frac{R_4}{R_3}\right)\left(1 + 2\frac{R_2}{R_1}\right)(V_2 - V_1)$

$$\frac{V_o}{(V_2 - V_1)} = \left(\frac{R_4}{R_3}\right)\left(1 + 2\frac{R_2}{R_1}\right)$$

Substitute R_1 with Z_1, V_2 with V_2' and V_1 with V_1'.

$$Z_1 = R_1 + \frac{1}{j\omega C_1}$$

$$Z_1 = \frac{1 + j\omega C_1 R_1}{j\omega C_1}$$

$$V_2' = \frac{R_c}{R_c + \frac{1}{j\omega C_c}} \cdot V_2 = \frac{j\omega C_c R_c}{1 + j\omega C_c R_c} \cdot V_2$$

$$V_1' = \frac{R_c}{R_c + \frac{1}{j\omega C_c}} \cdot V_1 = \frac{j\omega C_c R_c}{1 + j\omega C_c R_c} \cdot V_1$$

$$V_0 = \left(\frac{R_4}{R_3}\right)\left(1 + 2\frac{R_2}{R_1}\right)(V_2 - V_1)$$

$$V_0 = \left(\frac{R_4}{R_3}\right)\left(1 + 2\frac{R_2}{\frac{1+jwC_1R_1}{jwC_1}}\right)\left(\frac{jwC_cR_c}{1+jwC_cR_c}V_2 - \frac{jwC_cR_c}{1+jwC_cR_c}V_1\right)$$

$$= \left(\frac{R_4}{R_3}\right)\left[1 + 2\frac{jwC_1R_2}{1+jwC_1R_1}\right]\frac{jwC_cR_c}{1+jwC_cR_c}(V_2 - V_1)$$

$$= \left(\frac{R_4}{R_3}\right)\left[\frac{1+jwC_1R_1 + jw2C_1R_2}{1+jwC_1R_1}\right]\frac{jwC_cR_c}{1+jwC_cR_c}(V_2 - V_1)$$

$$= \frac{R_4}{R_3}\frac{[1+jwC_1(R_1 + 2R_2)]}{1+jwC_1R_1}\frac{(jwC_cR_c)}{1+jwC_cR_c}(V_2 - V_1)$$

$$\frac{V_0}{(V_2 - V_1)} = \frac{R_4}{R_3}\frac{[1+jwC_1(R_1 + 2R_2)]}{(1+jwC_1R_1)}\cdot\frac{jwC_cR_c}{(1+jwC_cR_c)}$$

Pole zero cancellation : $\boxed{C_1(R_1 + 2R_2) = C_cR_c}$