Convert Pressure

R_s : specific gas constant (J/kg/K)
R_d : specific gas constant of dry air (287 J/kg/K)
g : 9.80665 m/s^2
γ : -0.0065 K/m

$$dp = -\rho g dz$$

$$dp = -\frac{p}{R_s T} g dz$$

$$p = p_0 * \left(\frac{T}{T_0}\right)^{-\frac{g}{R_d \gamma}} \qquad constant: \quad \gamma = \frac{dT}{dz}$$

$$p = p_0 * \left(\frac{T}{T_0}\right)^{-\frac{g}{R_d \gamma}}$$

$$p = p_0 * \left(\frac{T}{T - \gamma * h}\right)^{-\frac{g}{R_d \gamma}} \qquad (\because \ T_0 = T - \gamma * h)$$

$$p = p_0 * \left(1 + \frac{\gamma * h}{T - \gamma * h}\right)^{-\frac{g}{R_d \gamma}}$$

$$\therefore \quad p = p_0 * \left(1 - \frac{0.0065 * h}{T(℃) + 273.15 + 0.0065 * h}\right)^{5.257} \quad , \quad p_0 = p * \left(1 - \frac{0.0065 * h}{T(℃) + 273.15 + 0.0065 * h}\right)^{-5.257}$$

Reference) World Meteorological Organization / CIMO/ET-Stand-1/Doc. 10 (20.XI.2012)
https://www.wmo.int/pages/prog/www/IMOP/meetings/SI/ET-Stand-1/Doc-10_Pressure-red.pdf
(p6 eq(4))

Keisan
2018/1/24