$V_{in\_min} = 0.25$ $V_{O\_MIN} = 1$ $V_{REF} = 5$

$V_{in\_max} = 0.8$ $V_{O\_MAX} = 4.95$

Write the equations for the two cases in the system and solve for the gain and offset coeffcients (m and b)

1 $1 = m \cdot 0.25 + b$

2 $4.95 = m \cdot 0.8 + b$

Solve Eqn 2 for b

$b = 4.95 - 0.8 \cdot m$

Plug b back into Eqn1 and solve for m

$1 = m \cdot 0.25 + (4.95 - 0.8 \cdot m)$

$1 = 4.95 - 0.55 \cdot m$

$m = 7.18181818181818181818182$

Plug m back into Eqn 2 and solve for b

$b = 4.95 - 0.8 \cdot (7.18181818181818181818182)$

$b = -0.795454545454545454545456$

Double Check the results for m and b

$Vo_{min} := 7.18181818181818181818182 \cdot 0.25 + -0.795 = 1$

$Vo_{max} := 7.18181818181818181818182 \cdot 0.8 + -0.795 = 4.95$

Solve for the circuit component values:

Assuming R1 || R2 is << RG, then

$$m = \frac{R_F + R_G}{R_G}$$

Plug in m and solve for RF

$$7.18181818181818181818182 = \frac{R_F + R_G}{R_G}$$

$R_F = 6.18181818181818181818182 \cdot R_G$

R1 and R2 can be solved for once b, VREF, and RF/RG are known

$$|b| = V_{REF} \cdot \left(\frac{R_F}{R_G}\right) \cdot \left(\frac{R_2}{R_1 + R_2}\right)$$

$$0.795 = 5 \cdot 6.18181818181818181818182 \cdot \left(\frac{R_2}{R_1 + R_2}\right)$$

$R_1 = 37.879359634076615209 \cdot R_2$