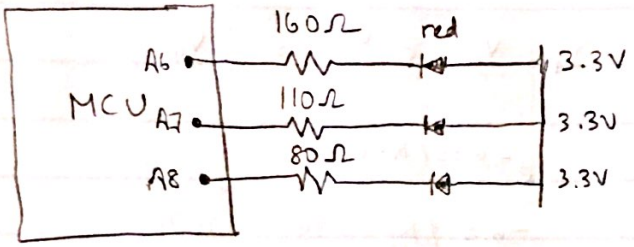
HW07



Voltage across resistor

Red : 3.3V - 1.7V = 1.6V / 10mA = 160Ω

Green : 3.3V - 2.2V = 1.1V / 10mA = 110Ω

Blue : 3.3V - 2.5V = 0.8V / 10mA = 80Ω

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def rgb(red, green, blue):
    r = Pin(A6, mode = Pin.OPEN_DRAIN)
    g = Pin(A7, mode = Pin.OPEN_DRAIN)
    b = Pin(A8, mode = Pin.OPEN_DRAIN)
```

$\tau = R \times C$

$V_c = V_s (1 - e^{-t/RC})$

HW07

2. $v_1 = V_1 (1 - e^{-t/RC})$

$v_1 = 3/4\ V_1$

$3/4 = 1 - e^{-t/R \times C}$

$= 1 - e^{-2.7s/R_1 \times 6.9mF}$

$e^{-2.7s/R_1 \times 6.9mF} = 1/4$

$\ln(1/4) = -2.7s/6.9mF \cdot R_1$

$6.9mF \cdot R_1 = -2.7s/\ln(1/4)$

$R_1 = -2.7s/\ln(1/4) \cdot 6.9mF$

$= \boxed{282.3\,\Omega}$

$V_1 = V_H \times e^{-t/RC} = \frac{1}{3} V_H$

$e^{-6.3s/R \cdot 6.9mF} = \frac{1}{3}$

$-6.3s/R_2 \cdot 6.9mF = \ln(1/3)$

$R_2 = -6.3s/\ln(1/3) \cdot 6.9mF$

$= \boxed{831.1\,\Omega}$

$\boxed{R_1 = 282.3\,\Omega}$

$\boxed{R_2 = 831.1\,\Omega}$

3.

no finger	r = 50%	$T_1 =$	$-(\ln 1/2)/500k\Omega \cdot 4.9pF =$ 282917 s
finger	r = 50%	$T_1 =$	$-(\ln 1/2)/500k\Omega \cdot 4.9pF \cdot 1.2 =$ 235764 s
no finger	r = 60%	$T_1 =$	$-(\ln 3/5)/500k\Omega \cdot 4.9pF =$ 208500 s
finger	r = 60%	$T_1 =$	$-(\ln 3/5)/500k\Omega \cdot 4.9pF \cdot 1.2 =$ 173750 s

$V_c = V_{dd} \cdot e^{-t/RC} = r \cdot V_{dd}$

$r = e^{-T_1/RC}$

$\ln r = -T_1/R \cdot C$

$T_1 = -(\ln r)/(R \cdot C)$

no finger	r = 50%	$T_1 + T_2 =$	$282917 \cdot 2 =$ 565834 seconds
finger	r = 50%	$=$	$235764 \cdot 2 =$ 471528 seconds
no finger	r = 60%	$=$	$208500s + -\ln(2/5)/500k\Omega \cdot 4.9pF =$ 582496 seconds
finger	r = 60%	$=$	$173750s + -\ln(2/5)/500k\Omega \cdot 4.9pF =$ 485419 seconds