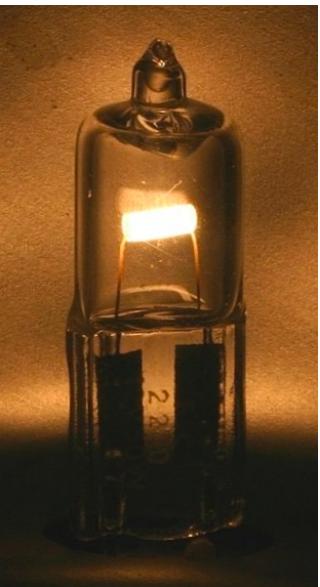


Electro Workshop 2

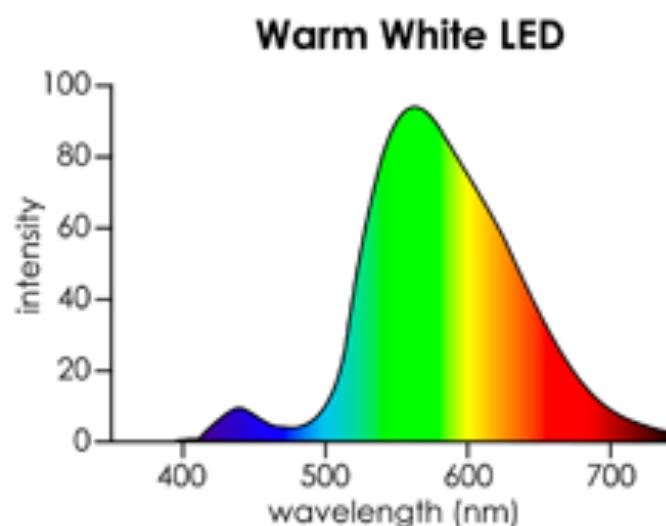
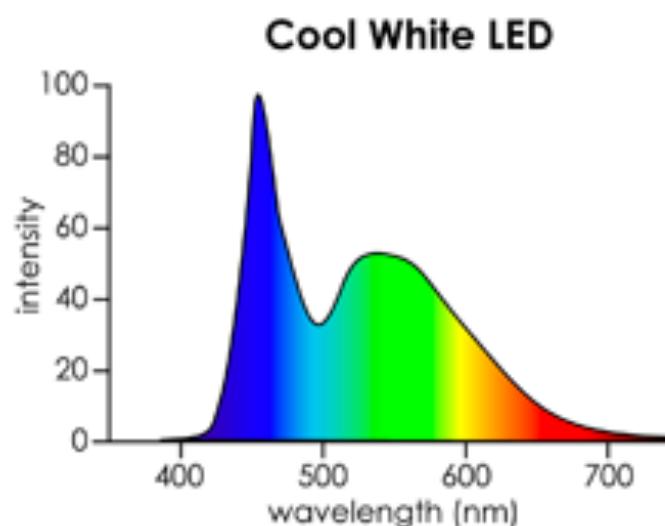
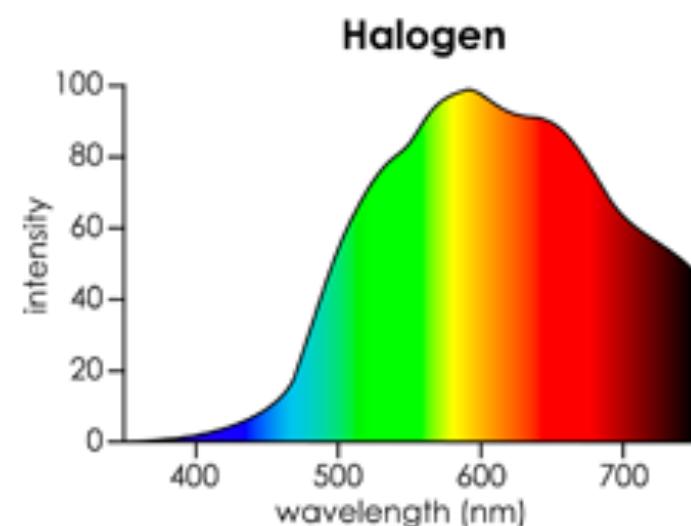
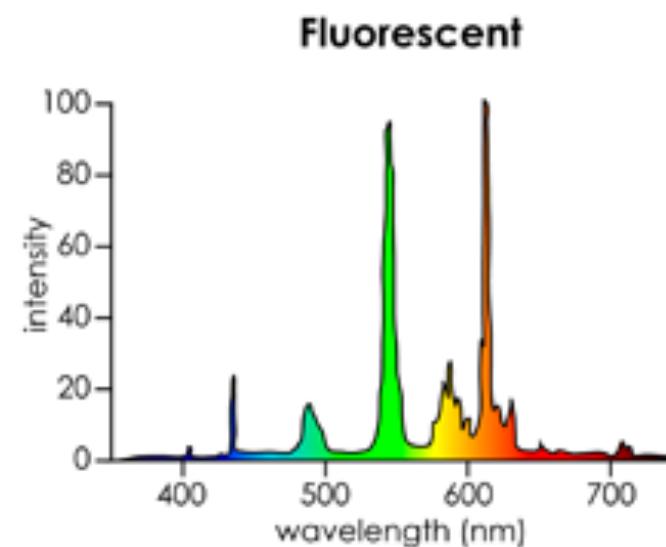
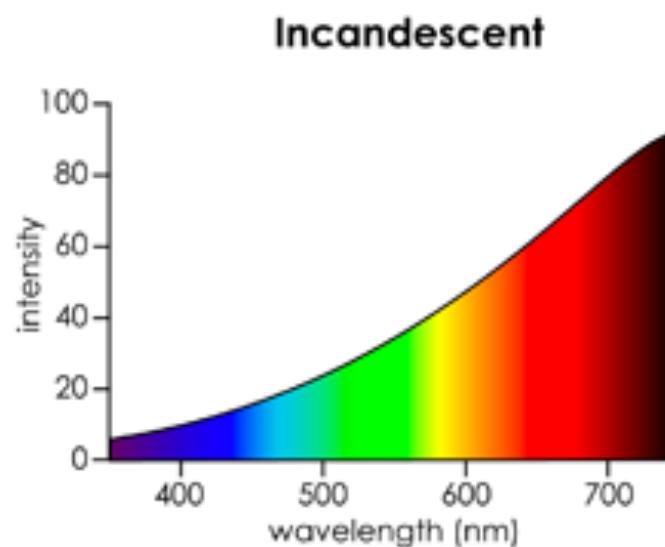
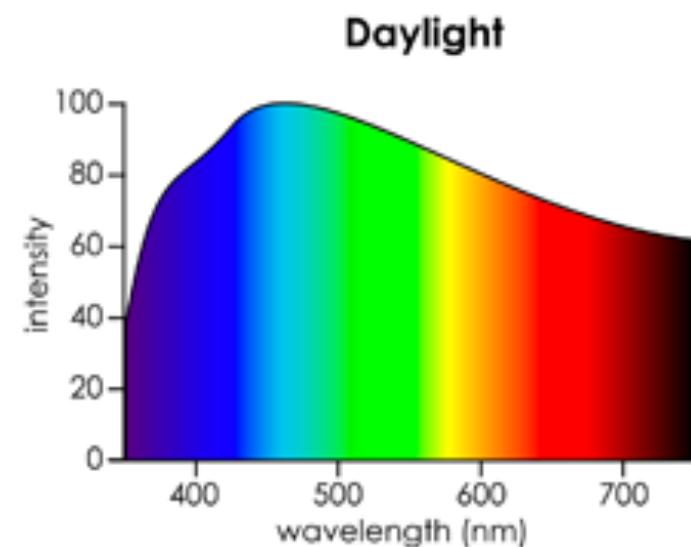
Ing. Gabriel Války, PhD.

<https://x.valky.eu/elec2>

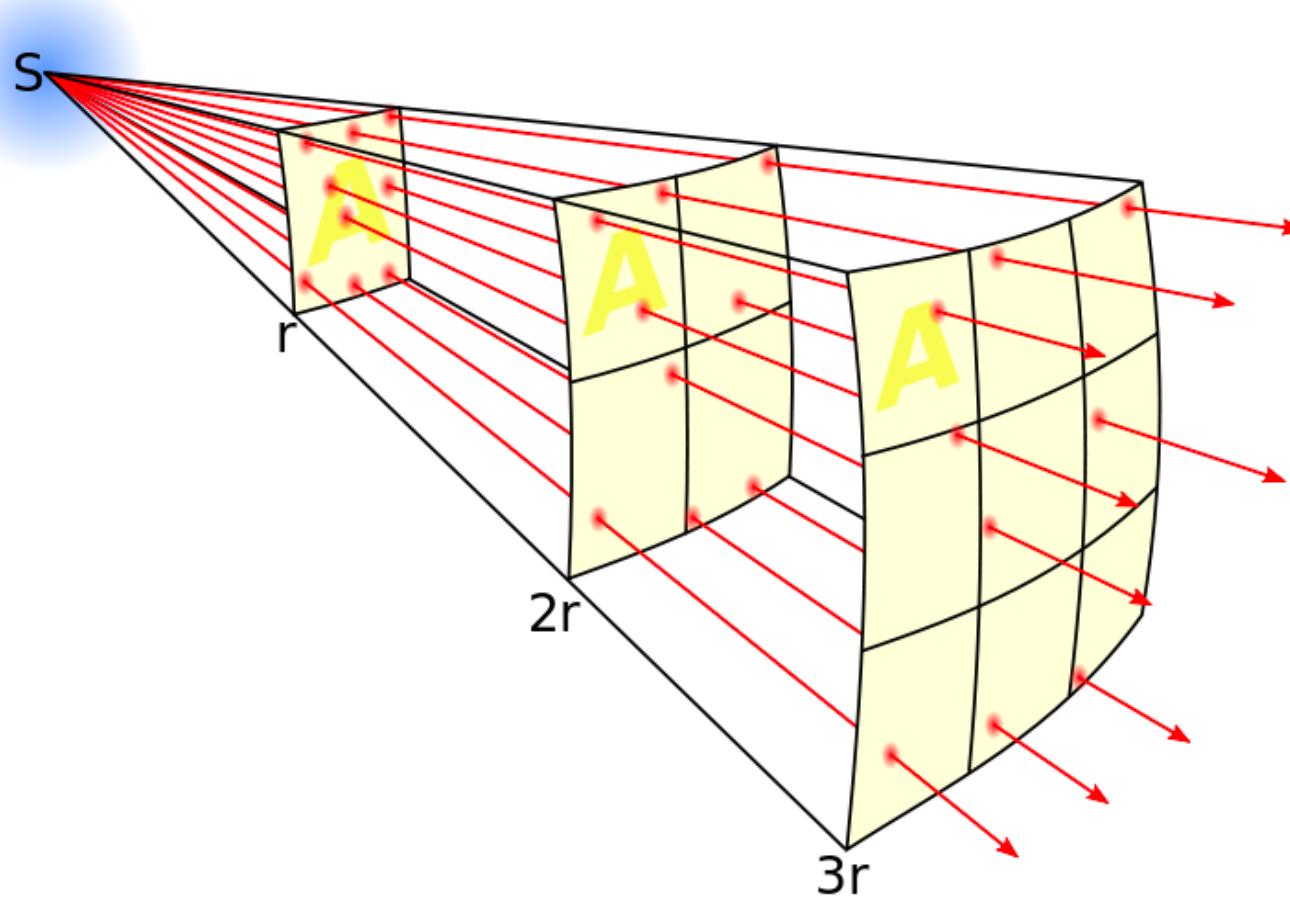
Svetelné zdroje



Spektrum svetelných zdrojov



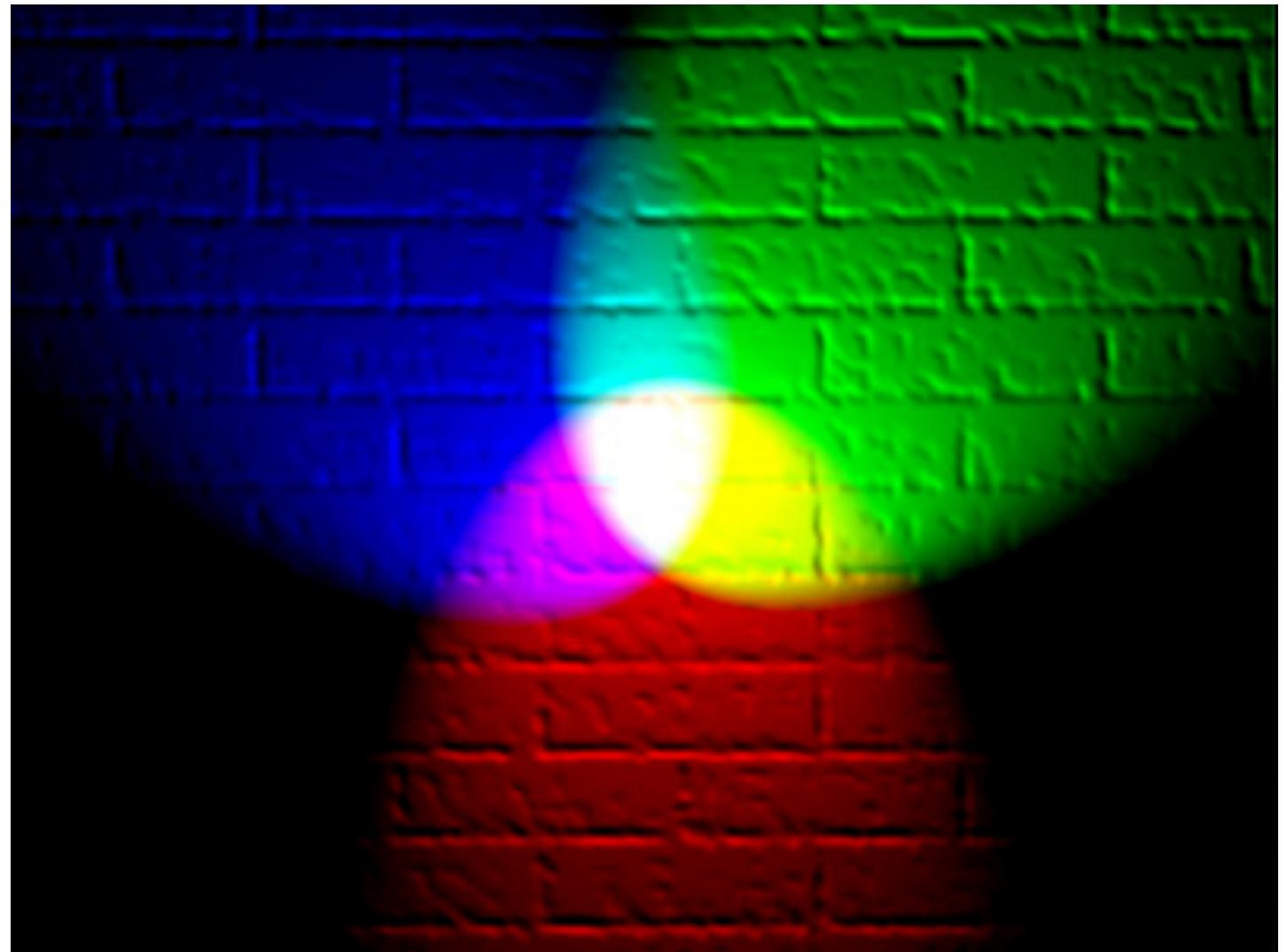
Bodový zdroj svetla



Ukážka

- Volt-ampérová charakteristika žiarovky
- Ohmov zákon: $U = R \cdot I$
- Výkon: $P = U \cdot I$
- Napätie: $U[V]$
- Prúd: $I[A]$
- Odpor: $R[\Omega]$
- Výkon: $P[W]$

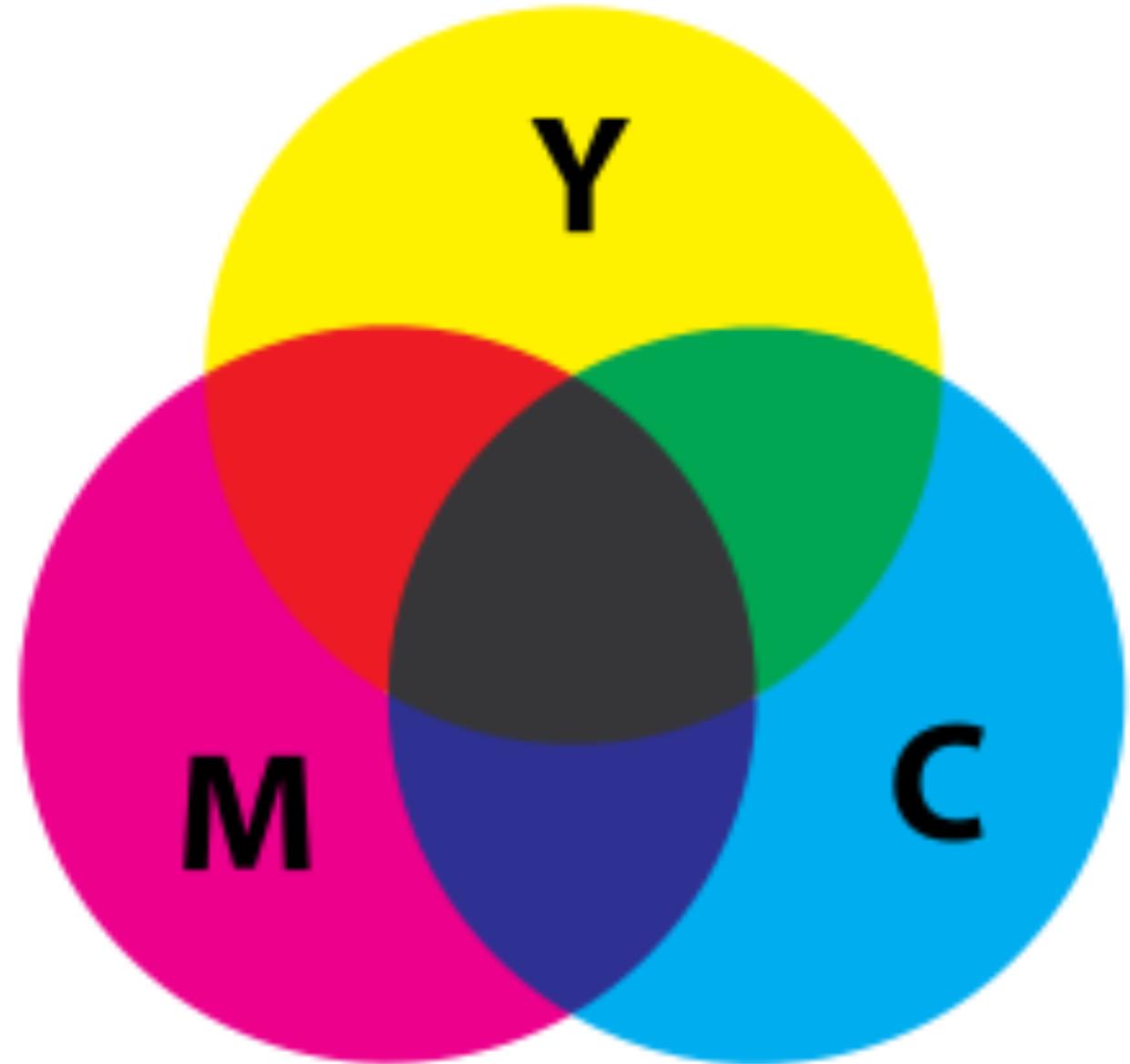
Farby: Aditívny model



https://upload.wikimedia.org/wikipedia/commons/3/3d/Additive_colors.ogv

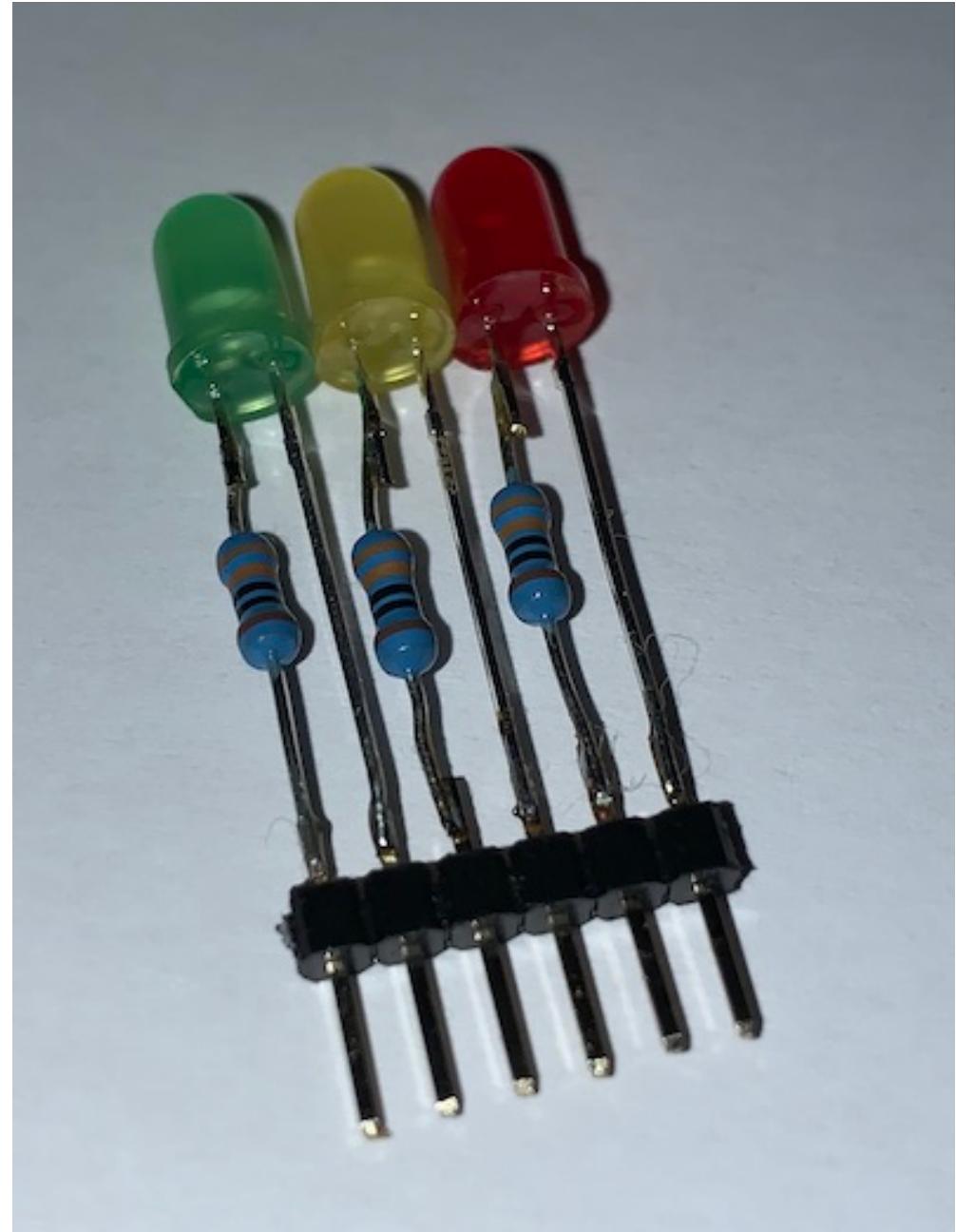
Farby:

Subtraktívny model

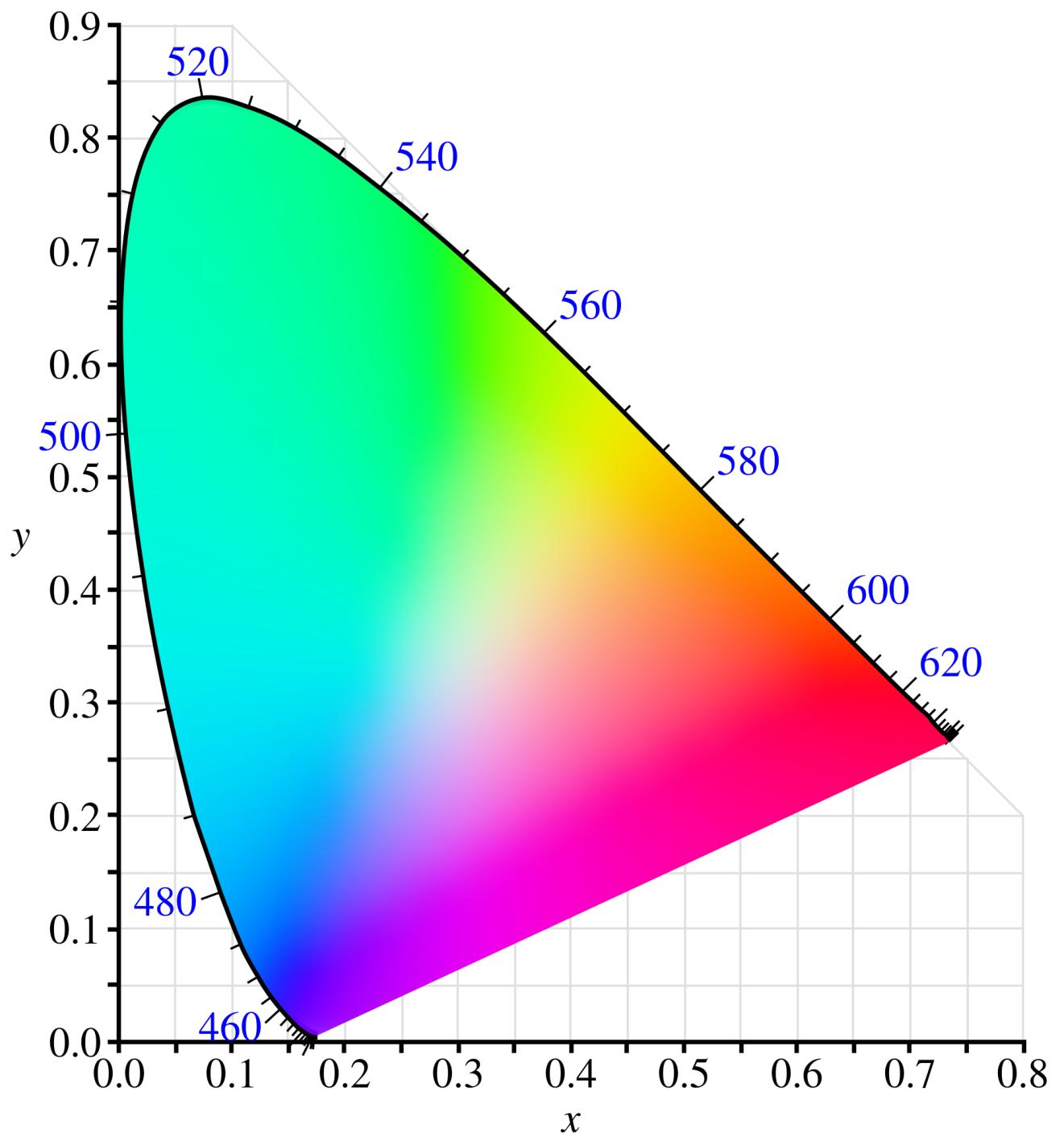


3x LED

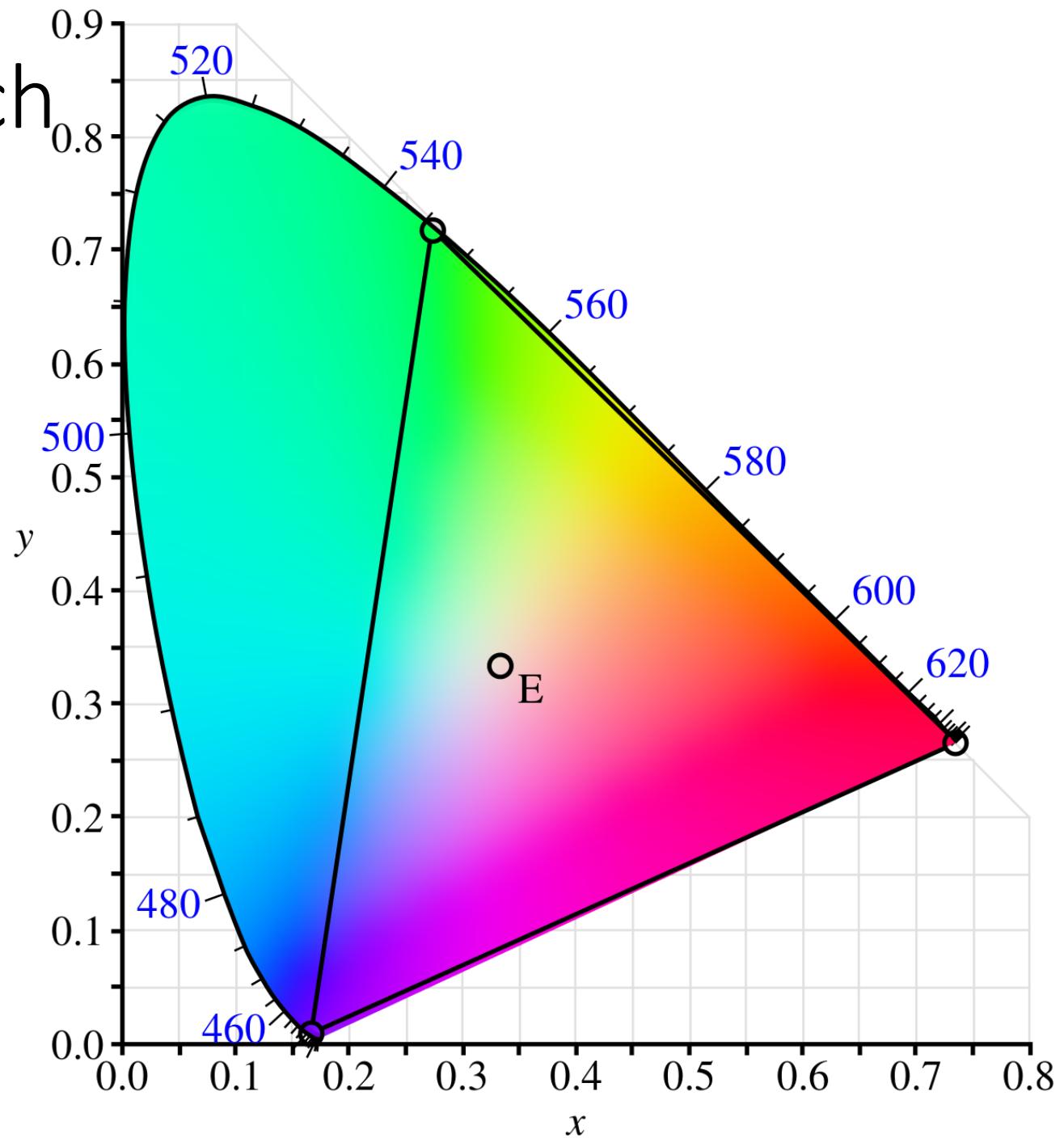
- Koľko vývodov potrebujeme?
- V akej oblasti gametu sa pohybujeme?



CIE 1931



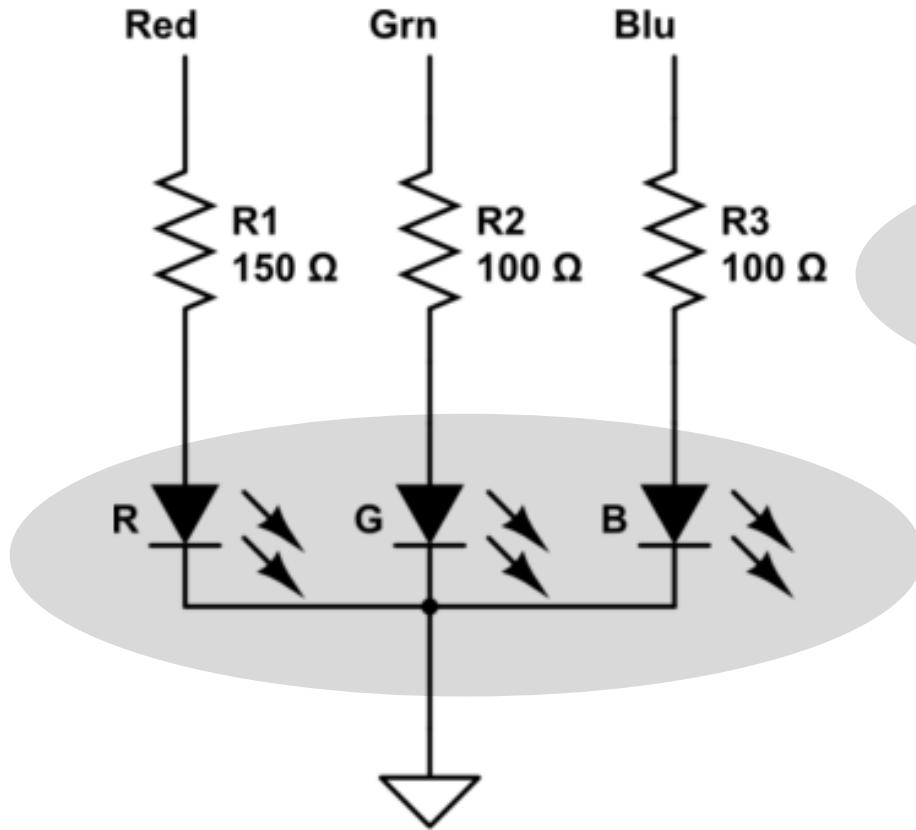
Gamut primarnych farieb



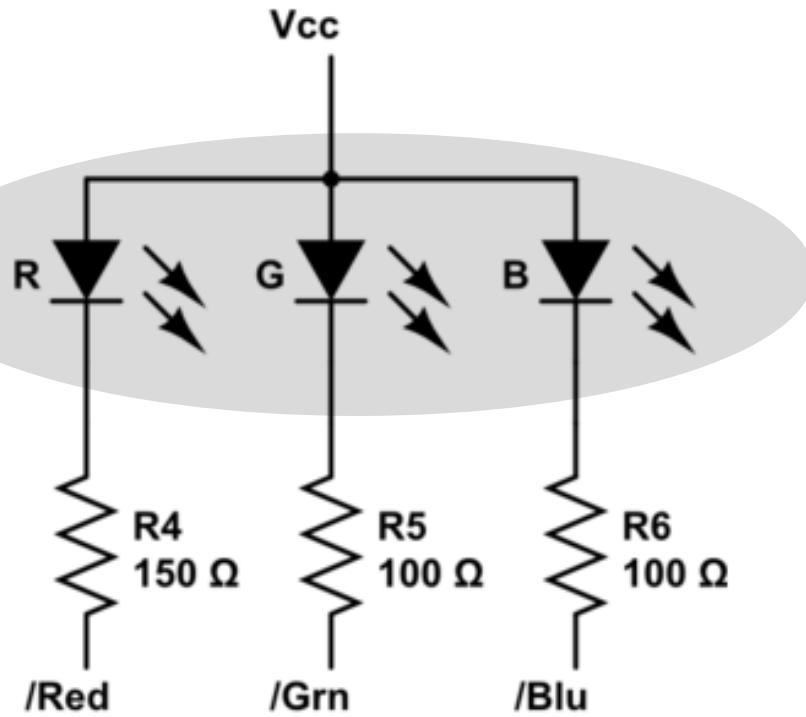
RGB LED



Zapojenie so spoločnou katódou/anódou



Common Cathode Circuit



Common Anode Circuit

LED – regulácia jasu prúdom

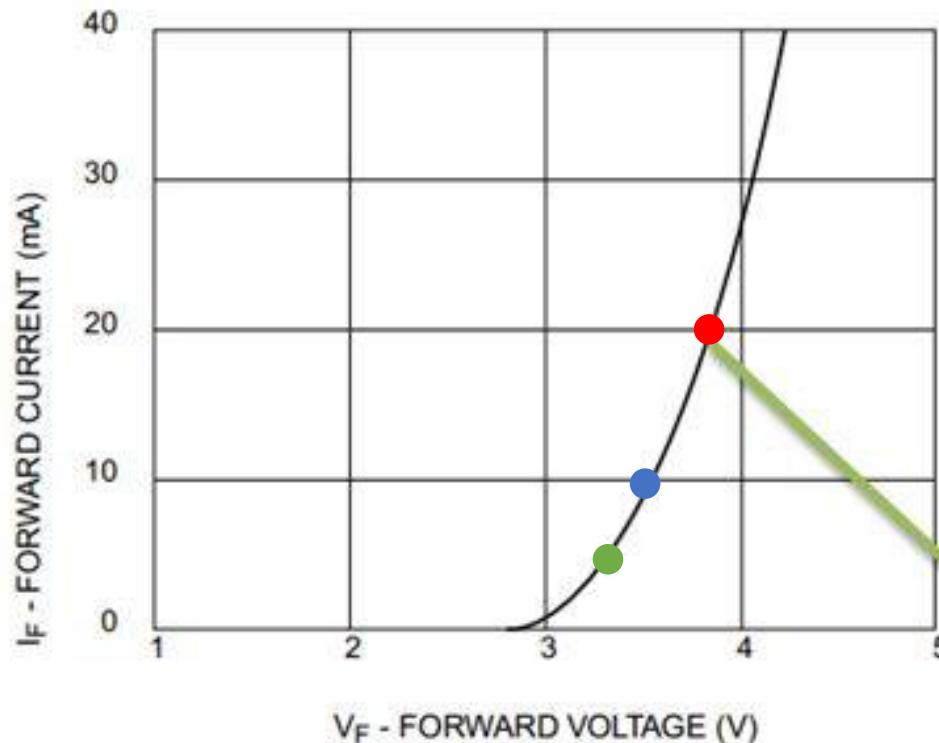


Fig.1 Forward Current vs. Forward Voltage

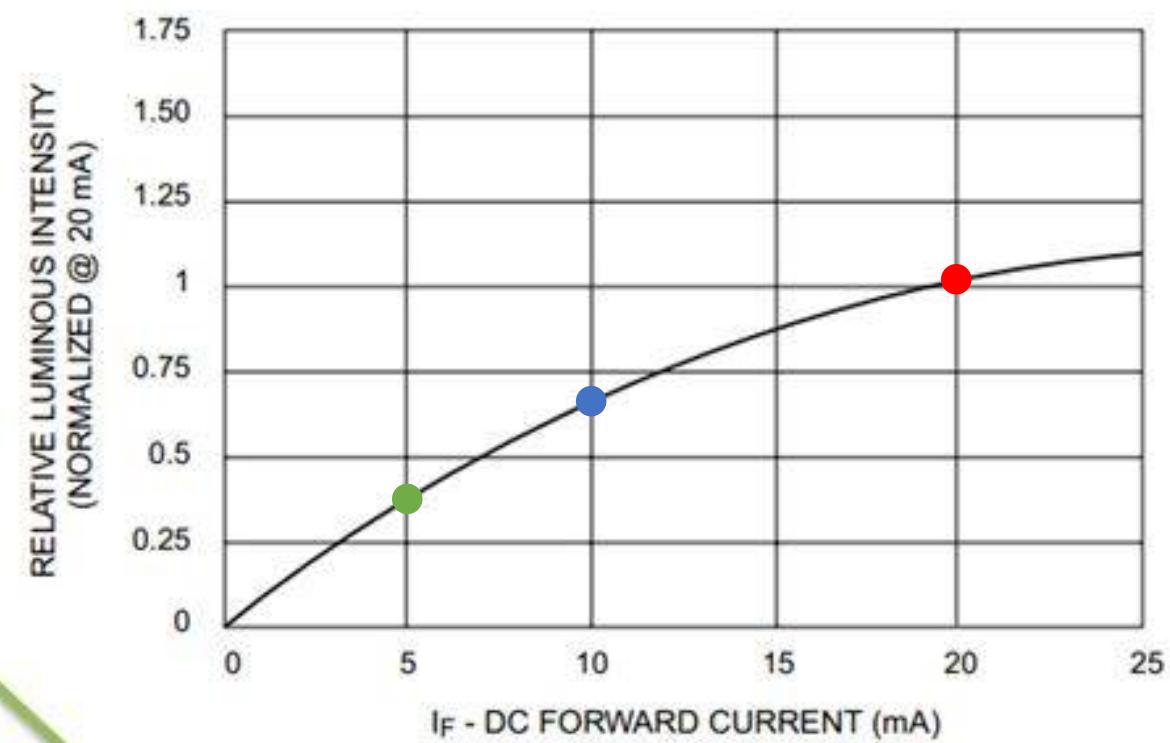
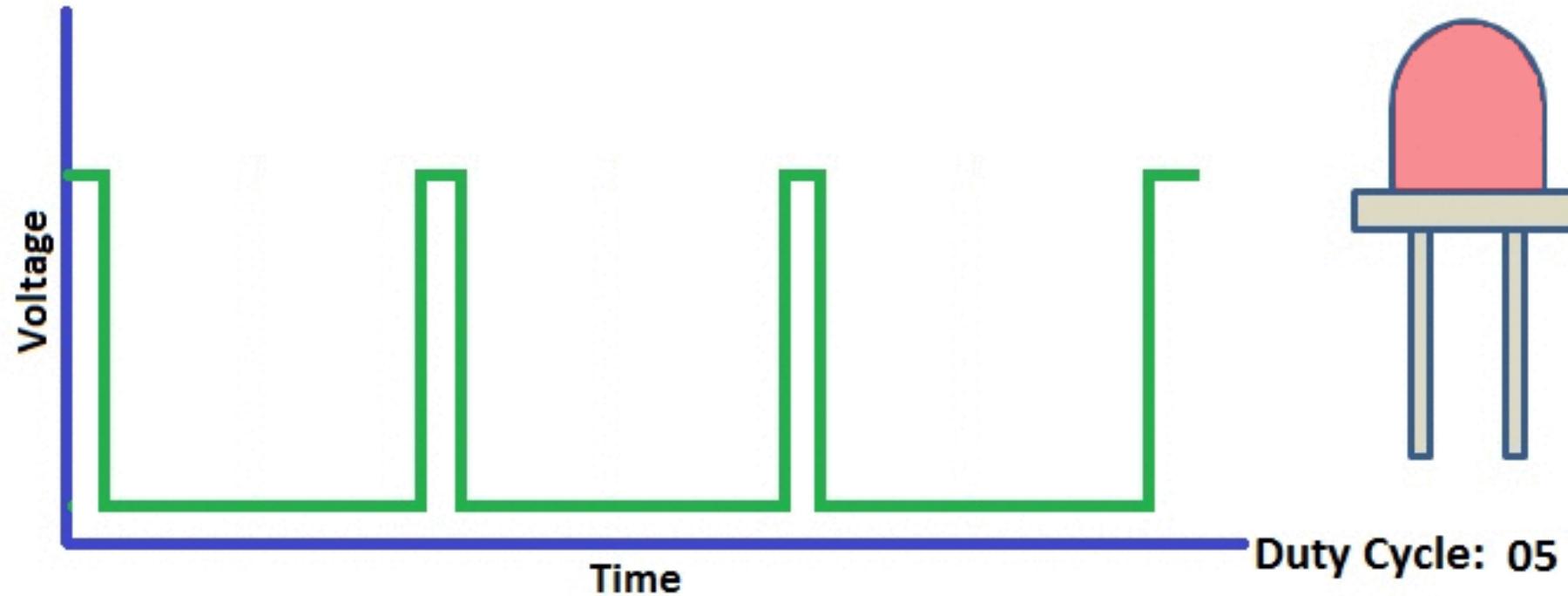
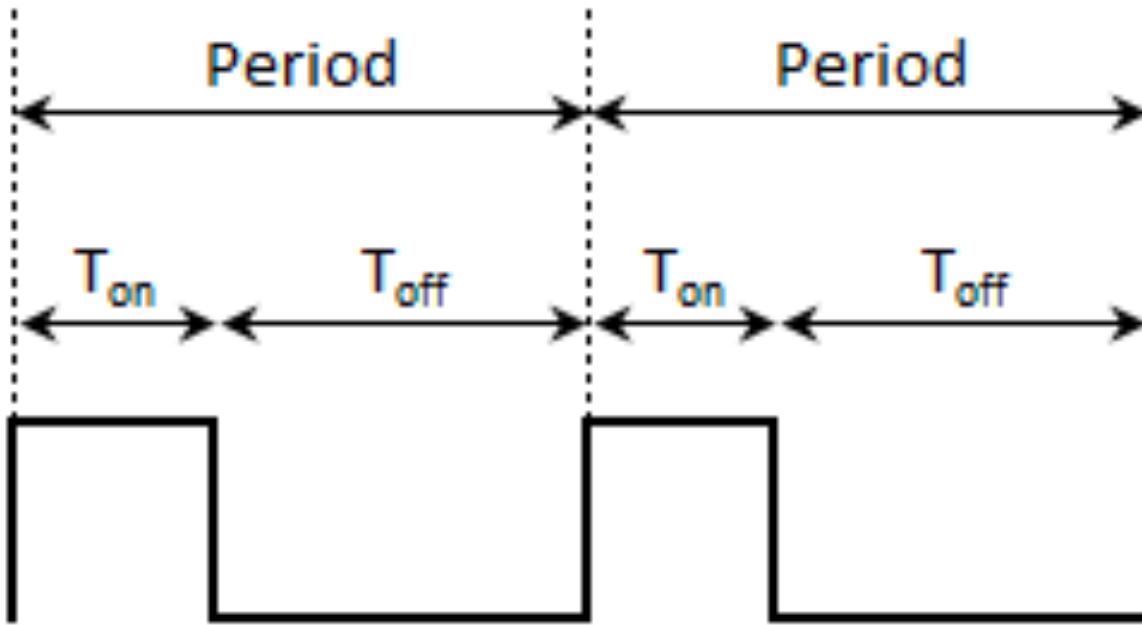


Fig.2 Relative Luminous Intensity vs. DC Forward Current

PWM – pulzne šírková modulácia





Čas zopnutia: T_{on} [s]

Čas vypnutia: T_{off} [s]

Periód: T [s] = $T_{on} + T_{off}$

Frekvencia: f [Hz] = $1/T$

Strieda (Duty cycle): D [%] = $T_{on}/T * 100$

Ukážka

- PWM regulácia jasu
- Frekvencia
- blikajúci efekt

Lineárna interpolácia

$$y = y_1 + k * (y_2 - y_1)$$

- y – výstupná premenná
- k - parameter
- y₁ .. y₂ – rozsah výstupnej premennej

0...1

Lineárna interpolácia

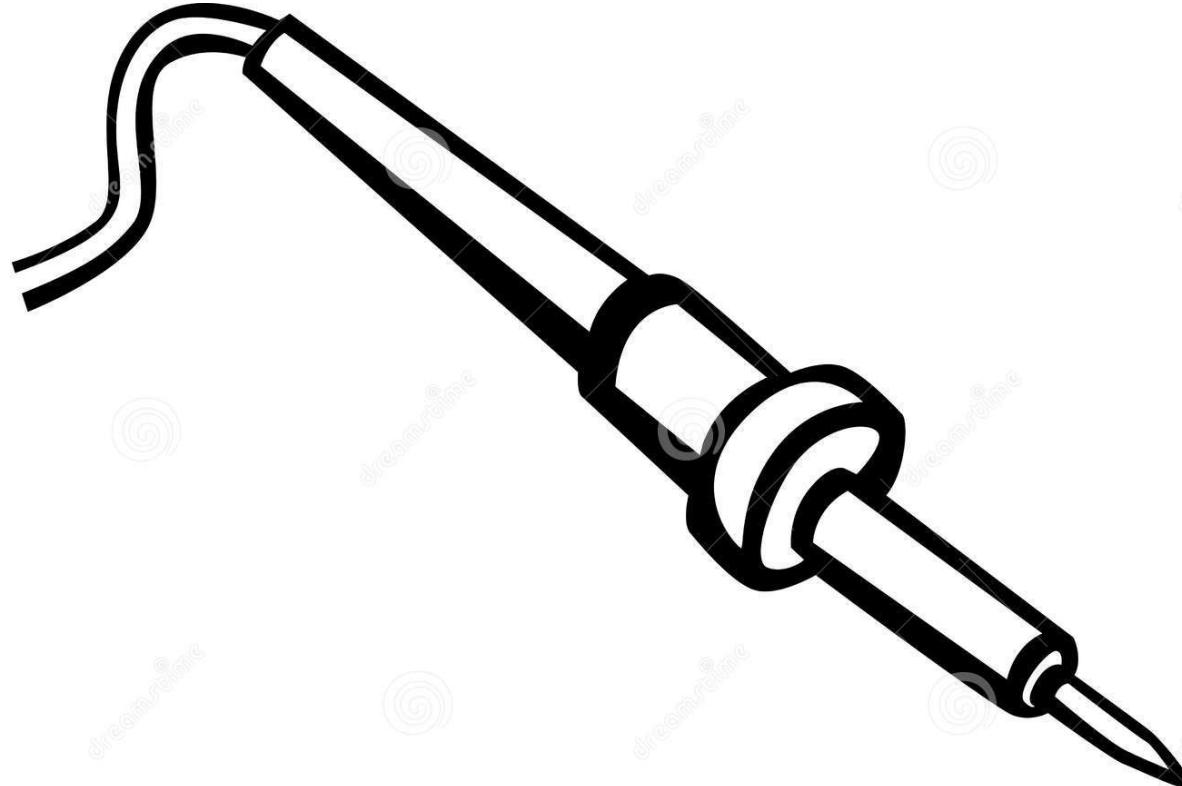
$$y = y_1 + \frac{x - x_1}{x_2 - x_1} * (y_2 - y_1)$$

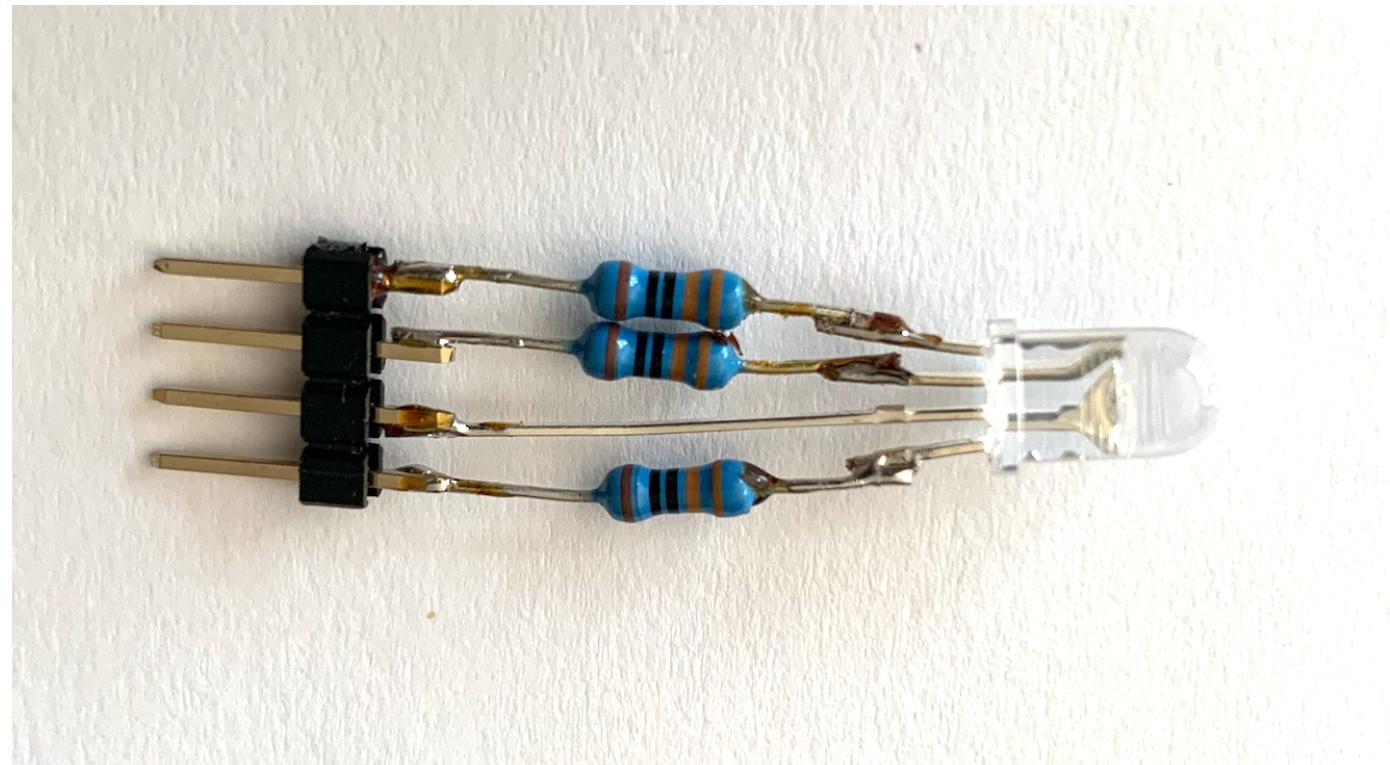
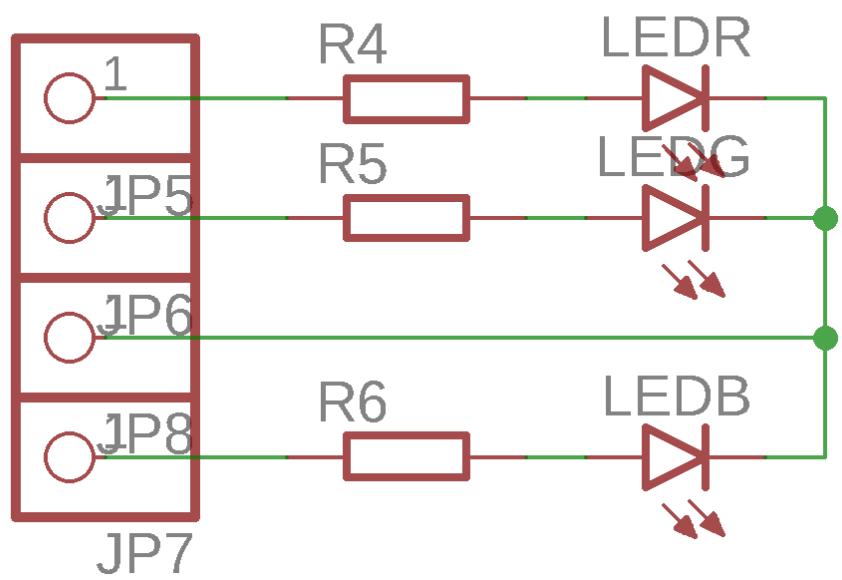
- x – vstupná premenná, y – výstupná premenná $0\dots1$
- $x_1 \dots x_2$ – rozsah vstupnej premennej
- $y_1 \dots y_2$ – rozsah výstupnej premennej

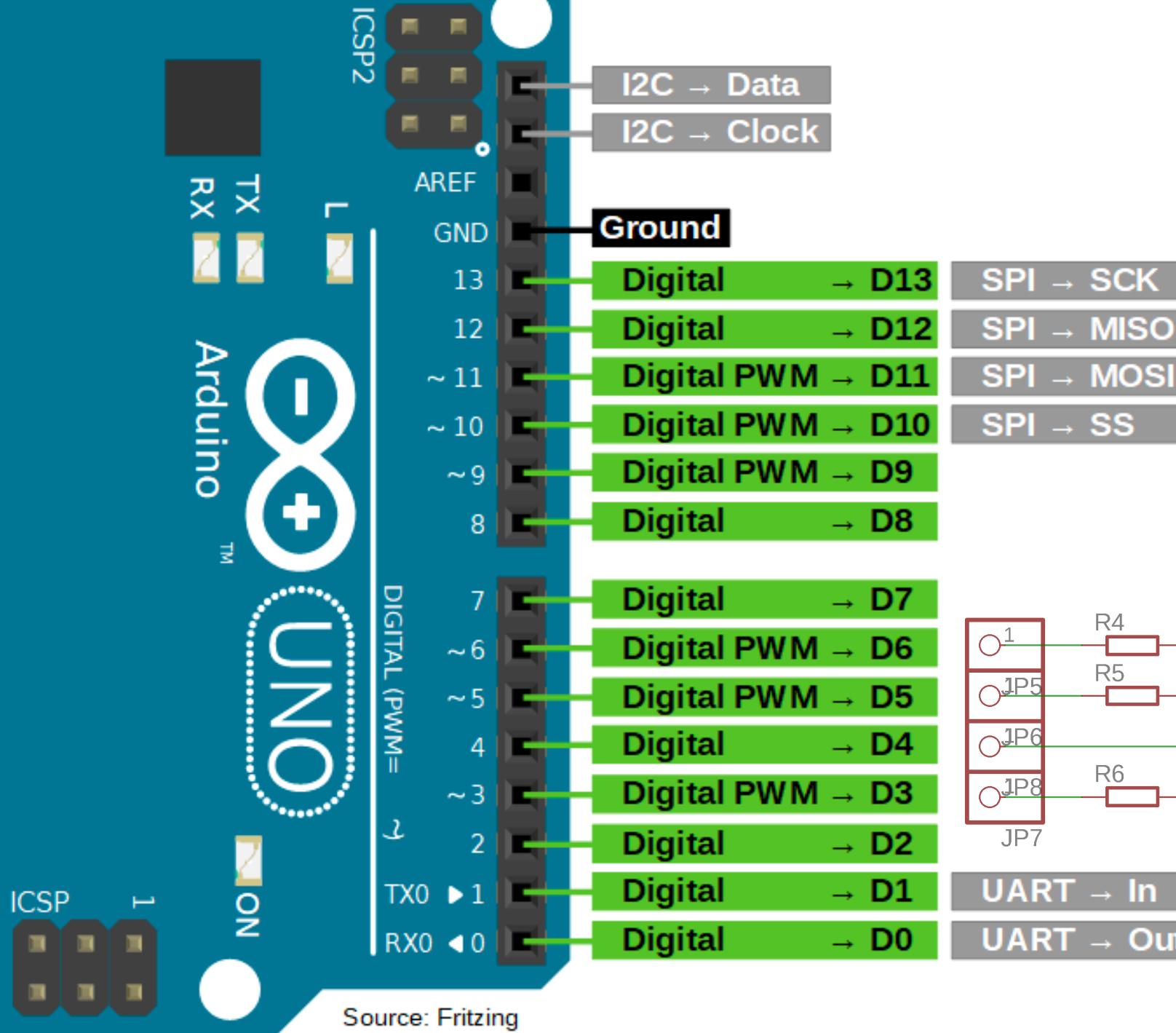
Lineárna interpolácia

```
1
2 int interpoluj(int odkial, int kam, int percent)
3 {
4     return odkial + (kam-odkial)*percent/100;
5 }
6
```

Letujeme!







Source: Fritzing

Úloha 1

- Vypísať čísla od 0..10
- Serial.begin(9600)
- Serial.print
- while

The screenshot shows the Arduino Serial Monitor window titled "COM7". The text area displays the following output:

```
Vypisujem cisla od 0 po 10:  
x=0  
x=1  
x=2  
x=3  
x=4  
x=5  
x=6  
x=7  
x=8  
x=9  
x=10
```

At the bottom of the window, there are three checkboxes: "Autoscroll" (unchecked), "Show timestamp" (unchecked), and "Newline" (unchecked).

Úloha 2a

x	y1
0	0
1	5
2	10
3	15
4	20
5	25
6	30
7	35
8	40
9	45
10	50

The screenshot shows a terminal window titled "COM7". The title bar includes a small icon of two overlapping circles and the text "COM7". The main area of the window displays the following text:
Vypisujem cisla od 0 po 10:
x=0 y1=0
x=1 y1=5
x=2 y1=10
x=3 y1=15
x=4 y1=20
x=5 y1=25
x=6 y1=30
x=7 y1=35
x=8 y1=40
x=9 y1=45
x=10 y1=50

At the bottom of the window, there are two checkboxes: "Autoscroll" and "Show timestamp". To the right of these checkboxes is a vertical scroll bar.

Úloha 2b

x	y1
0	0
1	5
2	10
3	15
4	20
5	25
6	30
7	35
8	40
9	45
10	50

x	y2
0	3
1	8
2	13
3	18
4	23
5	28
6	33
7	38
8	43
9	48
10	53

x	y3
0	100
1	92
2	84
3	76
4	68
5	60
6	52
7	44
8	36
9	28
10	20

Úloha 3

- Otestovať funkciu interpoluj
- Interpolovať hodnotu od 50 do 10,
vypísať v sto krokoch

The screenshot shows a terminal window titled "COM7". The text area contains the following output:

```
Vypisujem cisla od 0 po 100 s krokom 5:  
x=0 y=50  
x=5 y=48  
x=10 y=46  
x=15 y=44  
x=20 y=42  
x=25 y=40  
x=30 y=38  
x=35 y=36  
x=40 y=34  
x=45 y=32  
x=50 y=30  
x=55 y=28  
x=60 y=26  
x=65 y=24  
x=70 y=22  
x=75 y=20  
x=80 y=18  
x=85 y=16  
x=90 y=14  
x=95 y=12  
x=100 y=10
```

At the bottom of the window, there are two checkboxes: "Autoscroll" and "Show timestamp".

Úloha 4

- Blink.ino
 - Rozsvietiť R, G, B zvlášť
 - Koľko farebných kombinácií vieme vytvoriť?
 - Svieti každá rovnakým jasom?
-
- pinMode
 - digitalWrite

Úloha 5

- Pomocou blink.ino a zvyšovania frekvencie určiť,
- kedy blikajúci jav prestane byť pozorovateľný

Úloha 6

- Príkaz Analog.write
- Zistite v akom rozsahu je vstupný argument
- Vytvorte bielu farbu
- Vytvorte vašu obľúbenú farbu

Úloha 7

- Farebný prechod z červenej do modrej a naspäť
- Príkaz while alebo for

Úloha 8

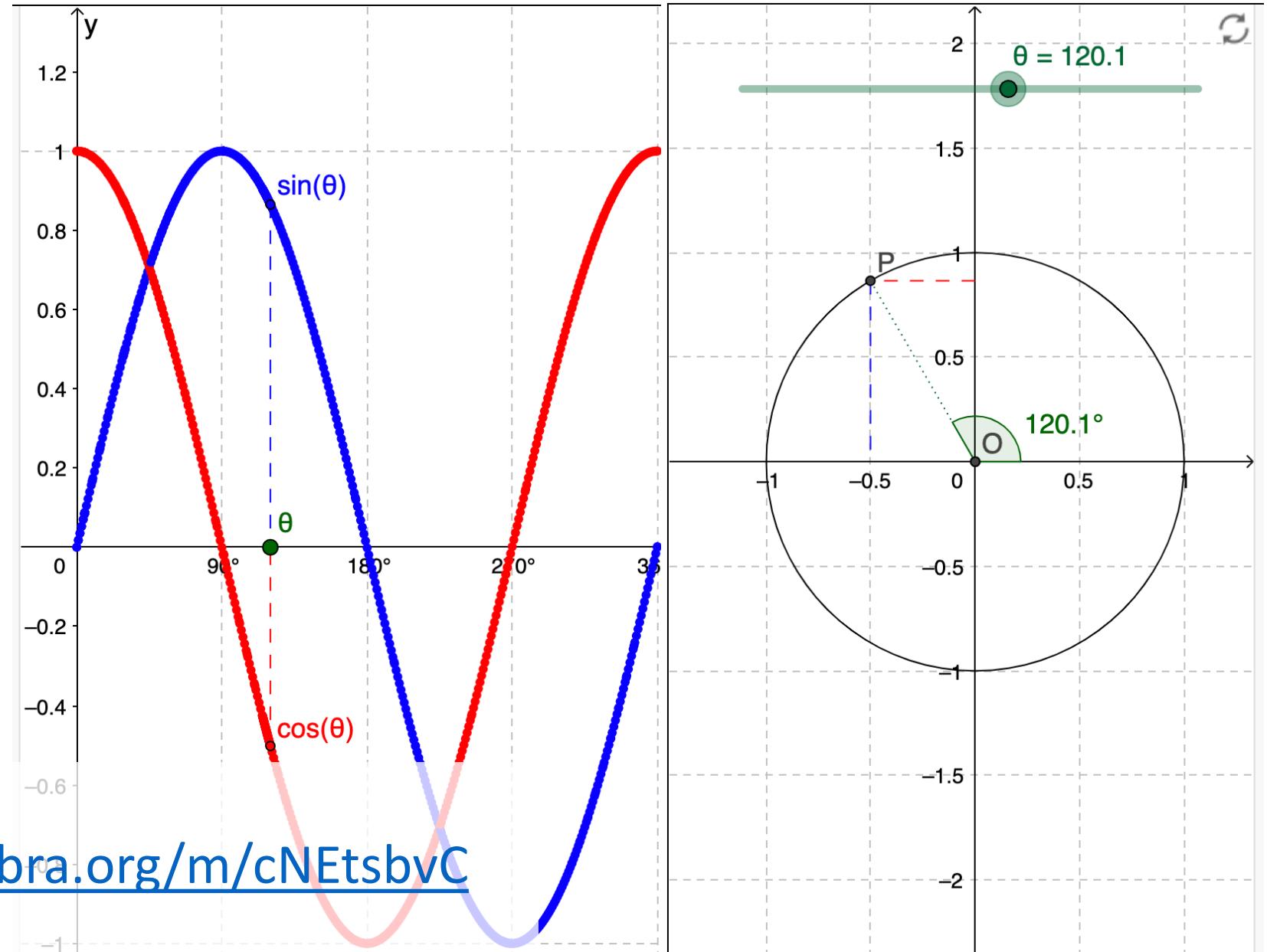
- Vytvorte farby dúhy a prepínajte medzi nimi

Úloha 9

- Plynulý prechod farieb dúhy s interpoláciou

Úloha 10

- Funkcie \cos , \sin
- Argument v rad
- $2\pi = 360^\circ$
- <https://www.geogebra.org/m/cNEtsbvC>



Ďakujem!

Ing. Gabriel Války, PhD.

<https://x.valky.eu/elec2>