

# Fototranzistor

Unipolární fototranzistor při různých intenzitách osvětlení. Naměřeno:

```
In[1]:= P1 = {{0, 0}, {1, 5}, {2, 8.8}, {3, 12.1}, {4, 15.7}, {5, 18.8}}
```

```
Out[1]= {{0, 0}, {1, 5}, {2, 8.8}, {3, 12.1}, {4, 15.7}, {5, 18.8}}
```

```
In[2]:= P2 = {{0, 0}, {1, 53}, {2, 55}, {3, 63}, {4, 69}, {5, 75}}
```

```
Out[2]= {{0, 0}, {1, 53}, {2, 55}, {3, 63}, {4, 69}, {5, 75}}
```

```
In[3]:= P3 = {{0, 0}, {1, 193}, {2, 210}, {3, 230}, {4, 250}, {5, 260}}
```

```
Out[3]= {{0, 0}, {1, 193}, {2, 210}, {3, 230}, {4, 250}, {5, 260}}
```

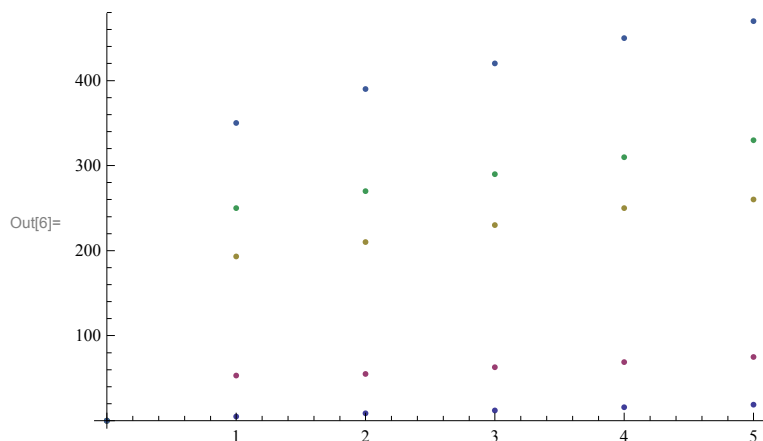
```
In[4]:= P4 = {{0, 0}, {1, 250}, {2, 270}, {3, 290}, {4, 310}, {5, 330}}
```

```
Out[4]= {{0, 0}, {1, 250}, {2, 270}, {3, 290}, {4, 310}, {5, 330}}
```

```
In[5]:= P5 = {{0, 0}, {1, 350}, {2, 390}, {3, 420}, {4, 450}, {5, 470}}
```

```
Out[5]= {{0, 0}, {1, 350}, {2, 390}, {3, 420}, {4, 450}, {5, 470}}
```

```
In[6]:= ListPlot[Table[Pn, {n, 1, 5}]]
```



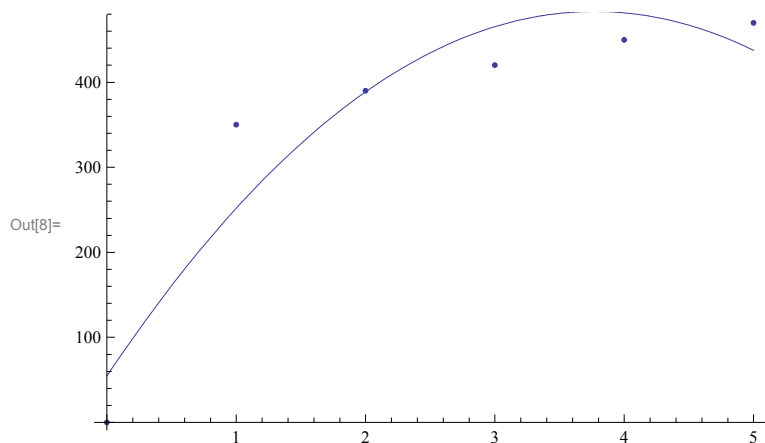
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## Aproximace kvadratickým polynomem

```
In[7]:= f = Fit[P5, {1, x, x2}, x]
```

```
Out[7]= 54.6429 + 227.464 x - 30.1786 x2
```

```
In[8]:= Show[{ListPlot[P5], Plot[f, {x, 0, 5}]]]
```

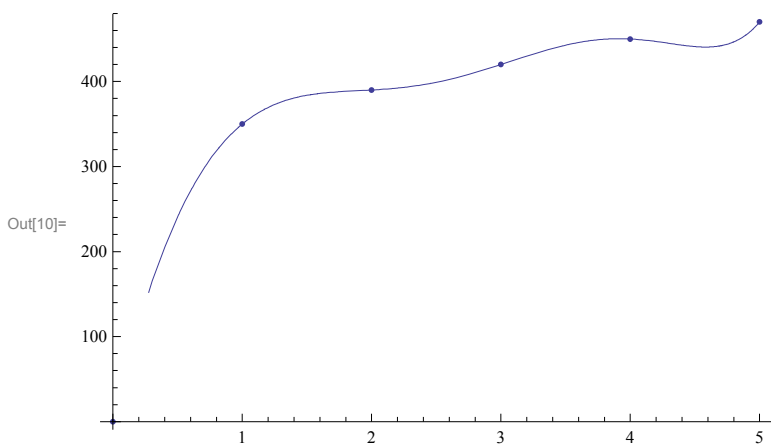


## Aproximace polynomem vyššího stupně

```
In[9]:= f = Fit[P5, Table[x^i, {i, 0, 7}], x]
```

Out[9]=  $3.83277 \times 10^{-13} + 652.6 x - 378.433 x^2 + 71.9694 x^3 + 5.9839 x^4 - 1.82488 x^5 - 0.363841 x^6 + 0.0680893 x^7$

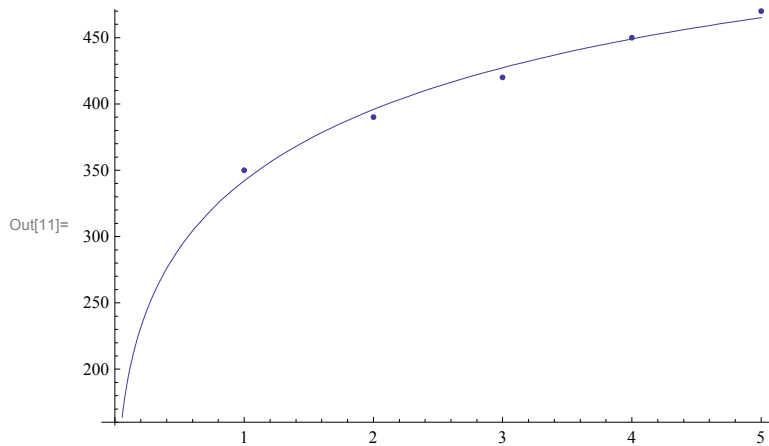
```
In[10]:= Show[{ListPlot[P5], Plot[f, {x, 0, 5}]]]
```



Nevhodné funkce pro náš případ!

## Hledání lepší báze funkcí – odmocniny

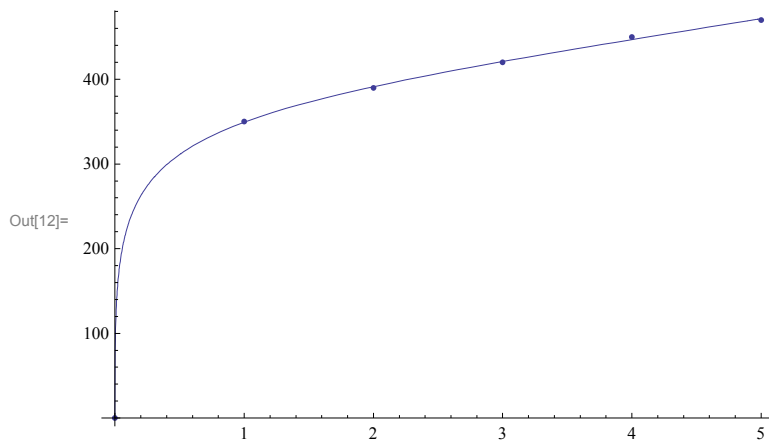
```
In[11]:= f = Fit[P5, {1, Sqrt[x], x^(1/3)}, x]; Show[{Plot[f, {x, 0, 5}], ListPlot[P5]]]
```



```
In[12]:= f = Fit[P5, Prepend[Table[x^i, {i, 3}], 1], x]; ? f;
Show[{Plot[f, {x, 0, 5}, AxesOrigin -> {0, 0}], ListPlot[P5]]]
```

Global`f

$$f = 0.0176863 + 869.026 x^{1/3} - 573.089 \sqrt{x} + 53.395 x$$

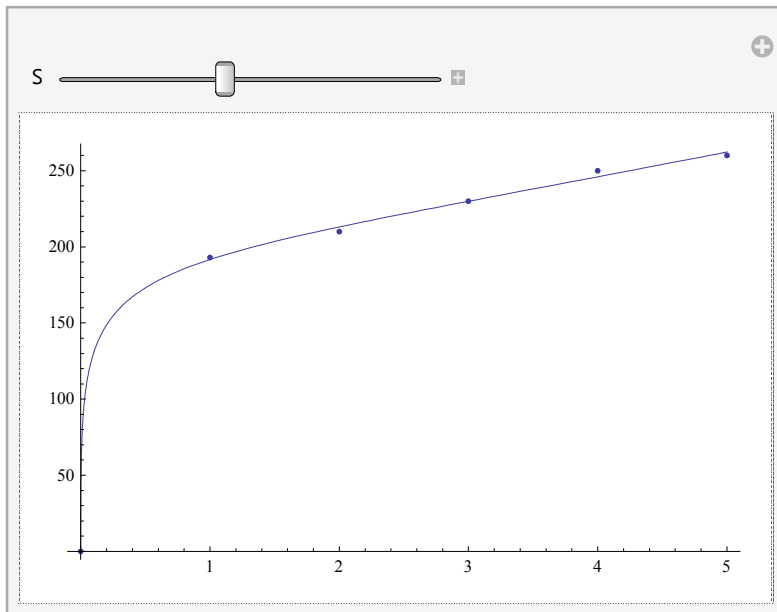


```

In[13]:= Manipulate [f = Fit [P3, Prepend [Table [x1/2, {i, S}], 1], x];
          Show [ {Plot [f, {x, 0, 5}, AxesOrigin → {0, 0}, PlotRange → Automatic],
                ListPlot [P3]}], {{S, 3}, 0, 7, 1} ]

```

Out[13]=

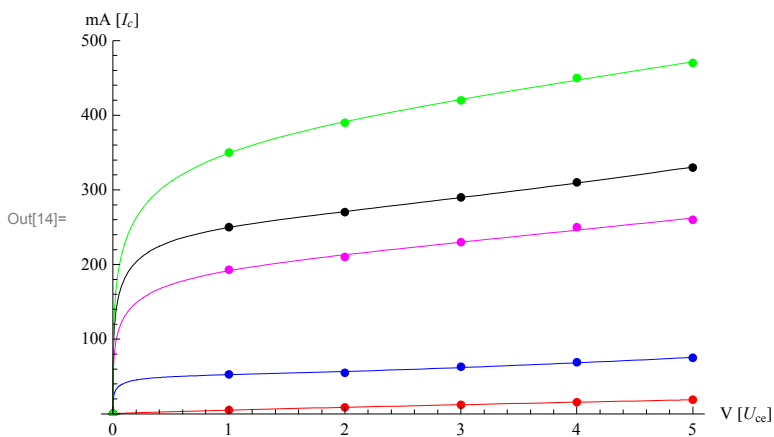


## Závěr: odmocninový polynom stupně 3

```

In[14]:= barva = {Red, Blue, Magenta, Black, Green};
          Show [ (f = Fit [P#, Prepend [Table [x1/2, {i, 3}], 1], x]; Show [Plot [f, {x, 0, 5},
          AxesOrigin → {0, 0}, PlotRange → {0, 500}, PlotStyle → barva [ [#]],
          AxesLabel → {"V [Uce]", "mA [Ic]}], ListPlot [P#, PlotRange → {0, 500},
          PlotStyle → {barva [ [#]], PointSize [Medium]}]] & /@ {1, 2, 3, 4, 5} ]

```



```
In[15]:= (Fit[P#, Prepend[Table[x1/i, {i, 3}], 1], x]) & /@ {1, 2, 3, 4, 5} // TableForm
```

```
Out[15]//TableForm=
```

```
0.000018632 - 1.01588 x1/3 + 3.4509  $\sqrt{x}$  + 2.57226 x  
0.0131926 + 201.105 x1/3 - 171.957  $\sqrt{x}$  + 23.2455 x  
0.0323613 + 532.087 x1/3 - 381.517  $\sqrt{x}$  + 41.0962 x  
0.00851415 + 790.189 x1/3 - 608.585  $\sqrt{x}$  + 68.023 x  
0.0176863 + 869.026 x1/3 - 573.089  $\sqrt{x}$  + 53.395 x
```