(1) $f(x) = x^4$

$f'(1)$ pomocí dopředné diference, $h = 0{,}01$

$$f'(a) \sim f_d'(a) = \frac{f(a+h) - f(a)}{h}$$

$$f_d'(1) = \frac{f(1+0{,}01) - f(1)}{0{,}01} = \frac{1{,}01^4 - 1^4}{0{,}01} = \frac{0{,}04060401}{0{,}01} = 4{,}060401$$

reálná hodnota:

$$f_r'(x) = (x^4)' = 4x^3, \quad f_r'(1) = 4$$

abs. chyba:

$$E_x = f_r'(x) - f_d'(x)$$

$$E_x = f_r'(1) - f_d'(1) = 4 - 4{,}060401 = -0{,}040401$$

rel. chyba:

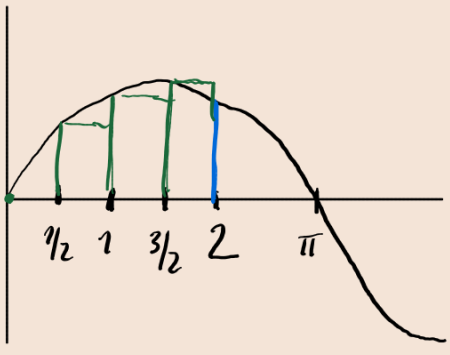
$$\varepsilon_x = \frac{|E_x|}{|x|} = \frac{0{,}040401}{4} = 0{,}010010025$$

(2) $\int_0^2 \sin(x)\,dx$

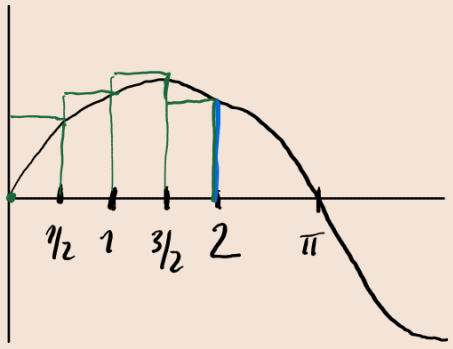
a) levé obdélníky, $h = 4$

$$\int_0^2 \sin(x) \sim \frac{1}{2} \cdot \left(\sin(0) + \sin\left(\frac{1}{2}\right) + \sin(1) + \sin\left(\frac{3}{2}\right) \right)$$

$$\sim 1{,}1592$$



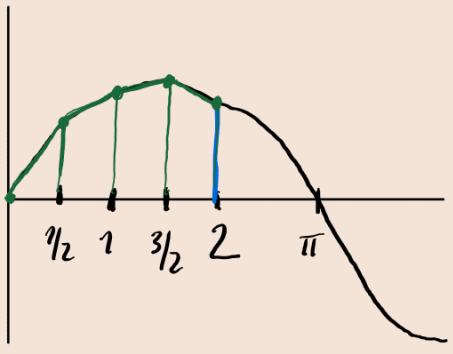
b) pravé obdélníky



$$\int_0^2 \sin(x) \sim \frac{1}{2}\left(\sin\left(\frac{1}{2}\right)+\sin(1)+\sin\left(\frac{3}{2}\right)+\sin(2)\right)$$

$$\sim 1{,}6138$$

c) Lichoběžníkové metody:



$$\int_0^2 \sin(x) \sim \frac{1}{4}\left(\sin(0)+2\cdot\sin\left(\frac{1}{2}\right)+2\cdot\sin(1)+2\cdot\sin\left(\frac{3}{2}\right)+\sin(2)\right)$$

$$\sim \frac{5{,}5467}{4} \sim 1{,}3865$$