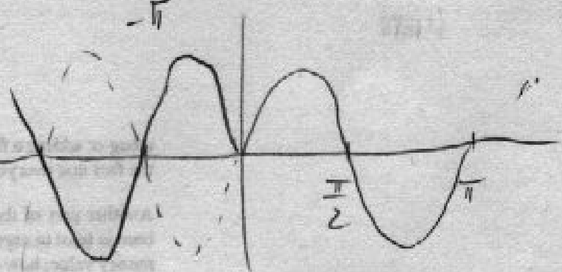
1

$$a_k = \frac{1}{\pi}\int_{-\pi}^{\pi} f(x)\cos kx\,dx \qquad a_0 = \frac{1}{\pi}\int_{-\pi}^{\pi} f(x)\,dx$$

$$b_k = \frac{1}{\pi}\int_{-\pi}^{\pi} f(x)\sin kx\,dx$$



$$F(x) = \begin{cases} \sin 2x, & x \geq 0 \\ -\sin 2x, & x < 0 \end{cases}$$

F razvijemo:

sodost $\Rightarrow b_k = 0$

SIMETRIJA

$$a_0 = \frac{1}{\pi}\int_{-\pi}^{\pi} F(x)\,dx = \frac{2}{\pi}\int_{0}^{\pi} \sin 2x\,dx = 0$$

$$a_2 = 0$$

$$a_k = \frac{2}{\pi}\int_{0}^{\pi} \sin 2x \cdot \cos kx\,dx = \frac{1}{\pi}\int_{0}^{\pi}\left(\sin((2-k)x) + \sin((2+k)x)\right)dx$$

$k \neq 2$

$$= -\frac{1}{\pi}\left[\frac{1}{2-k}\cos((2-k)x) + \frac{1}{2+k}\cos((2+k)x)\right]_0^{\pi} =$$

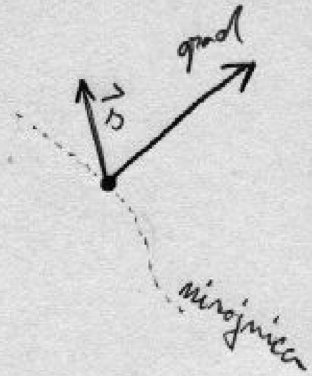
$$= -\frac{1}{\pi}\left[\frac{1}{2-k}\underbrace{\cos((2-k)\pi)}_{(-1)^k} + \frac{1}{2+k}\underbrace{\cos((2+k)\pi)}_{(-1)^k} + \frac{1}{2-k} + \frac{1}{2+k}\right] =$$

$$= \frac{1}{\pi}\left(1-(-1)^k\right)\frac{4}{4-k^2}$$

$$a_k = \begin{cases} 0; & k \text{ sod} \\ \frac{8}{\pi(4-k^2)}; & k \text{ lih} \end{cases}$$

$$\boxed{F(x) = \sum_{i=0}^{\infty} \frac{8}{\pi(4-(2i+1)^2)}\cdot\cos((2i+1)x)}$$

(2) $\text{grad}(h) = (-4x, -2y)$



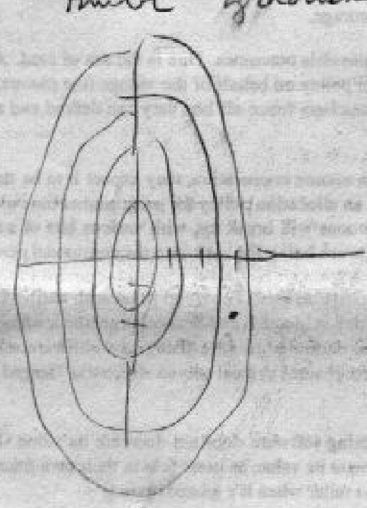
a) JUGOZAHOD - smer vektorja $\vec{s} = (-1, 1)$

$$\vec{s} \cdot \text{grad}(h) = 4x + 2y$$

$$\vec{s} \cdot \text{grad}(h)\Big|_{(30,-20)} = 4 \cdot 30 - 2 \cdot 20 = 80$$

↑ se dviga.
(ker je pozitivno)

b) v smeri gradienta (definicija):
$\vec{s} = (-120, 40)$



③ V polarnih koordinatah: $r = e^{\varphi}$ $\quad (\varphi = t)$

(logaritemska spirala)

$$\dot{x} = e^{t}(\cos t - \sin t)$$
$$\dot{y} = e^{t}(\cos t + \sin t)$$

Vzporednost z y osjo $\approx$ $\dot{x} = 0$ (in $\dot{y} \neq 0$)

$$\cos t = \sin t$$

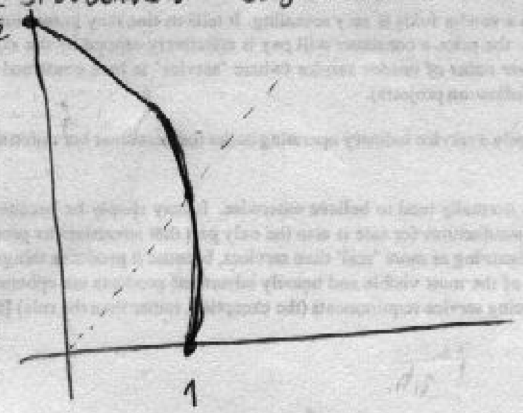
$$t_1 = \frac{\pi}{4} \quad t_2 = \frac{5\pi}{4}$$

Naklonski kot:

$$\operatorname{tg}\varphi = \frac{\dot{y}}{\dot{x}} = \frac{1}{-1} = -1$$

$$\underline{\underline{\varphi = -\frac{\pi}{4}}}$$

Lok: Skicirano logaritemsko spiralo med ~~polk~~ kotoma 0 in $\frac{\pi}{2}$

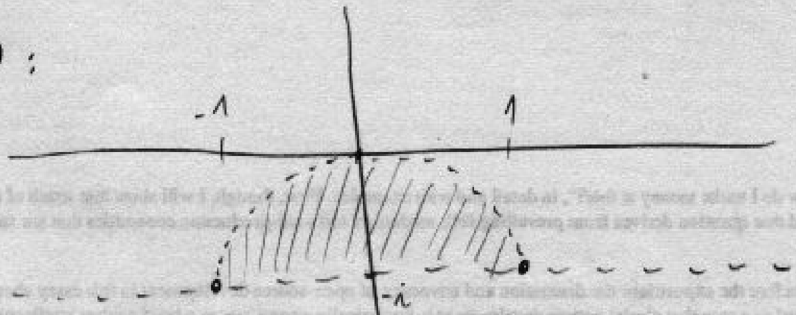


Dolžina loka:

npr.: $$l = \int_0^{\frac{\pi}{2}} \sqrt{r^2 + \left(\frac{\partial r}{\partial \varphi}\right)^2}\, d\varphi = \int_0^{\frac{\pi}{2}} \sqrt{2e^{2\varphi}}\, d\varphi = \underline{\underline{\sqrt{2}\left(e^{\frac{\pi}{2}} - 1\right)}}$$

(4) $: z \longmapsto \dfrac{z+2}{z+i}$

D:



$$-1-i \longmapsto i-1$$
$$1-i \longmapsto 3-i$$
$$-i \longmapsto \infty$$
$$0 \longmapsto -2i$$

f(D):