

$f: \mathbb{R} \times \mathbb{R}_+ \rightarrow \mathbb{R}$
 $S: \mathbb{R} \times \mathbb{D} \times \mathbb{R} \rightarrow \mathbb{R}$
 $f: \mathbb{R}^n \rightarrow \mathbb{R}$

$f(x,y) = \frac{\arccos(y-1)}{\sqrt{x^2}}$

$\rho = \arccos \omega$

$\langle -1, 1 \rangle$
 i) $y-1 \in \langle -1, 1 \rangle$
 ii) $x \neq 0$
 $\sqrt{x^2} \neq 0$

$y-1 \in \langle -1, 1 \rangle$
 $-1 \leq y-1 \leq 1$
 $0 \leq y \leq 2$

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$f(x,y) = \sqrt{x-y^2} + \sqrt{y-x^2}$

$x-y^2 \geq 0 \wedge y-x^2 \geq 0$
 $x \geq y^2 \wedge y \geq x^2$

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$f(x,y) = \sqrt{\sin(x+y)}$

$\sin(x+y) \geq 0$
 $\sin d \geq 0$
 $d \in \langle 0, \pi \rangle + 2k\pi$
 $\dots \cup \langle 0, \pi \rangle \cup \langle 2\pi, 3\pi \rangle \dots$
 $x+y \in \langle 0, \pi \rangle + 2k\pi \quad k \in \mathbb{Z}$
 $0 + 2k\pi \leq x+y \leq \pi + 2k\pi$
 $y \geq 0 + 2k\pi - x$
 $y \leq \pi + 2k\pi - x$

$k=0$
 $y \geq -x$
 $y \leq \pi - x$
 $k=1$
 $y \geq 2\pi - x$
 $y \leq 3\pi - x$

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$f(x,y) = \ln((x^2+y^2-1) \cdot (2-x^2-y^2))$

$(x^2+y^2-1)(2-x^2-y^2) > 0$

$1) x^2+y^2-1 > 0 \quad \vee \quad 2) x^2+y^2-1 < 0$
 $2-x^2-y^2 > 0 \quad \quad \quad 2-x^2-y^2 < 0$

$x^2+y^2 > 1$
 $x^2+y^2 < 2$

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$f(x,y) = \ln(\cos(y-x^2))$

$\cos(y-x^2) > 0$

$\cos d > 0 \Leftrightarrow d \in \langle -\frac{\pi}{2}, \frac{\pi}{2} \rangle + 2k\pi$
 $y-x^2 \in \langle -\frac{\pi}{2}, \frac{\pi}{2} \rangle + 2k\pi$
 $-\frac{\pi}{2} + 2k\pi < y-x^2 < \frac{\pi}{2} + 2k\pi$
 $y > x^2 - \frac{\pi}{2} + 2k\pi$
 $y < x^2 + \frac{\pi}{2} + 2k\pi$

$k=0$
 $y > x^2 - \frac{\pi}{2}$
 $y < x^2 + \frac{\pi}{2}$
 $k=1$
 $y > x^2 + \frac{3\pi}{2}$
 $y < x^2 + \frac{5\pi}{2}$

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$f(x,y) = \ln(xyz) + \ln(yz)$

$x, y, z > 0$
 $x, y, z > 0 \wedge y, z > 0$
 $x > 0 \wedge y > 0 \wedge z > 0$
 $x < 0 \wedge y > 0 \wedge z < 0$

$x > 0$
 $f(x,y) = \ln(xyz) + \ln(yz) = \ln(x \cdot y^2 \cdot z^2) = \ln(x) + 2\ln(y) + 2\ln(z)$
 $x > 0$
 $f(x,y) = \ln(x) + 2\ln(y) + 2\ln(z) = 1$

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$$f(x, y, z) = \sqrt{1 - x^2 - y^2 - z^2}$$

$$1 - x^2 - y^2 - z^2 \geq 0$$

$$x^2 + y^2 + z^2 \leq 1$$

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$y = f(x)$
 $c = f(x, y)$

1) $c=0 \Rightarrow \begin{cases} f(x, y) = 0 \\ x^2 + y^2 = 0 \\ x=y=0 \end{cases}$

2) $c=1 \Rightarrow \begin{cases} f(x, y) = 1 \\ x^2 + y^2 = 1 \end{cases}$

3) $c=-1 \Rightarrow \begin{cases} f(x, y) = -1 \\ x^2 + y^2 = -1 \end{cases}$

4) $c=2 \Rightarrow \begin{cases} f(x, y) = 2 \\ x^2 + y^2 = 2 \end{cases}$

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Prvky: $\begin{cases} \mathbb{R} \\ \mathbb{C} \end{cases}$ $\mathbb{R} \rightarrow \mathbb{C}$

$\{ \dots, p, q, r \}$

$k \in \mathbb{R} \Rightarrow \exists p$

$P_1(t) = (1, 2)$

$P_2(t) = (1, 2)$

$P_3(t) = (1, 2)$

$x=1$
 $x=1$

$\begin{cases} x \\ y \end{cases} \Rightarrow \begin{cases} P(t) = (1, t) \\ Q(t) = (t, 1) \\ R(t) = (t, t) \end{cases}$

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$p(t) = (r \cos t, r \sin t)$

$P(t) = (u(t), v(t))$
 $t_0 \Rightarrow \begin{cases} x = u(t_0) + s \cdot u'(t_0) \\ y = v(t_0) + s \cdot v'(t_0) \end{cases}$

$k(t) = [t^2 - t + 2, t^3 - 3t]$

1) $k'(t) = [2t - 1, 3t^2 - 3]$
 $k'(1) = [2 \cdot 1 - 1, 3 \cdot 1^2 - 3] = [1, 0]$
 $k(1) = [1^2 - 1 + 2, 1^3 - 3] = [2, -2] \sim (1, -3)$
 $k(2) = [2^2 - 2 + 2, 2^3 - 3] = [4, 5]$
 $t: x = 1 + s$
 $y = 2 + 3s$

2) $k'(t) \perp x$
 $k'(2) = [2 \cdot 2 - 1, 3 \cdot 2^2 - 3] = [3, 9]$
 $\cdot (2, -1) \cdot 1 + 3 \cdot 2 - 3 = 0$

$3t^2 - 3 = 0 \Rightarrow t = \pm 1$

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$y = x$

$(1, 1) \rightarrow (1, 1)$

$c^1 = (2t - 1, 3t^2 - 3)$

$2t - 1 = k \cdot 1$
 $3t^2 - 3 = k \cdot 1$

$-2t + 1 + 3t^2 - 3 = 0$

$3t^2 - 2t - 2 = 0$

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5)

$x = r \cos t$
 $y = r \sin t$

$x^2 + y^2 = 1$

$x = 2 \cos t$
 $y = 4 \sin t$

$X = 4 + 2 \cos t$
 $Y = -2 + 4 \sin t$

$-2 + 4 \sin t = 0$
 $\sin t = \frac{1}{2}$
 $t = \frac{\pi}{6}$
 $t = \frac{5\pi}{6}$

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$$\begin{aligned} \Sigma(t) &= (2\cos t, \overset{2}{-}\sin t) \\ \Sigma'(t) &= (-2\sin t, 2\cos t) \\ \Sigma'(\frac{\pi}{6}) &= (-2\sin \frac{\pi}{6}, 2\cos \frac{\pi}{6}) \\ \Sigma'(\frac{\pi}{6}) &= (-1, 2\sqrt{3}) \end{aligned}$$

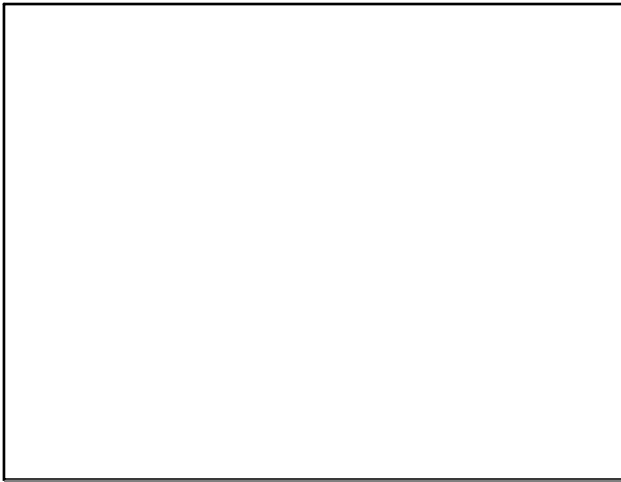
$t_1 = \frac{\pi}{6}$
 $t_2 = \frac{5\pi}{6}$

$$t: \begin{cases} x = \frac{\pi}{6} + s(-1) \\ y = 0 + s(2\sqrt{3}) \end{cases}$$

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$$\begin{aligned} \vec{s}(t) &= (4\cos t, -4\sin t, 2t) \\ \vec{s}'(t) &= (-4\sin t, -4\cos t, 2) \\ \kappa(t) &= \frac{1}{\sqrt{(-4\cos t)^2 + (-4\sin t)^2 + 2^2}} \\ \vec{s}'(\frac{\pi}{2}) &= (-4\sin(\frac{\pi}{2}), -4\cos(\frac{\pi}{2}), 2) \\ t_1: \begin{cases} x = 4\cos(t_2) + s(-4\sin(t_2)) \\ y = -4\sin(t_2) + s(-4\cos(t_2)) \\ z = -4 + 2s \end{cases} \\ z=0 &\Leftrightarrow -4 + 2s = 0 \\ & \quad s = 2 \end{aligned}$$

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