3) $F(u,v) = e^{\cos(u-v)}$, $(u,v) = \left(\frac{\pi}{4}, \frac{\pi}{4}\right)$ 	Δ3N2 N3

$F(u,v) = e^{\cos\left(\frac{\pi}{4} - \frac{\pi}{4}\right)} = e^{\cos 0} = e$

$\frac{dt}{du} = -e^{\cos(u-v)} \cdot \sin(u-v) \quad \frac{dt}{du}\bigg|_{\frac{\pi}{4},\frac{\pi}{4}} = -e \cdot 0 = 0$

$\frac{dt}{dv} = e^{\cos(u-v)} \cdot \sin(u-v) \quad \frac{dt}{dv}\bigg|_{\frac{\pi}{4},\frac{\pi}{4}} = e \cdot 0 = 0$

$\frac{d^2t}{du^2}\bigg|_{\frac{\pi}{4},\frac{\pi}{4}} = e^{\cos(u-v)} \cdot \sin^2(u-v) - \cos(u-v) \cdot e^{\cos(u-v)} = -e$

$\frac{d^2t}{dv^2}\bigg|_{\frac{\pi}{4},\frac{\pi}{4}} = e^{\cos(u-v)} \cdot \sin^2(u-v) - \cos(u-v) \cdot e^{\cos(u-v)} = -e$

$\frac{d^2t}{du\,dv}\bigg|_{\frac{\pi}{4},\frac{\pi}{4}} = -e^{\cos(u-v)} \cdot \sin^2(u-v) + \cos(u-v) \cdot e^{\cos(u-v)} =$

$= -e^1 \cdot 0 + 1 \cdot e^1 = e$

$F(u,v) = e + \frac{1}{2}\left(-e(u-u_0)^2 + 2e(u-u_0)\cdot(v-v_0) - e(v-v_0)^2\right) +$
$+ o\left((u-u_0)^2 + (v-v_0)^2\right) = e + \frac{1}{2}\left(-e\left(u-\frac{\pi}{4}\right)^2 + 2e\left(u-\frac{\pi}{4}\right)\cdot\right.$
$\left.\cdot\left(v-\frac{\pi}{4}\right) - e\left(v-\frac{\pi}{4}\right)^2\right) + o\left(\left(u-\frac{\pi}{4}\right)^2 + \left(v-\frac{\pi}{4}\right)^2\right)$

ДЗ№2

РО№1

1) a)
$$y=\left(\frac{1+x-x^2}{1-x+x^2}\right)$$

$$y'=\frac{(1+x-x^2)'(1-x+x^2)-(1+x-x^2)(1-x+x^2)'}{(1-x+x^2)^2}=$$

$$=\frac{(1-2x)(1-x+x^2)-(1+x-x^2)(-1+2x)}{(1-x+x^2)^2}=$$

$$=\frac{(1-x+x^2-2x+2x^2-2x^3)-(-1+2x-x+2x^2+x^2-2x^3)}{(1-x+x^2)^2}=$$

$$=\frac{2-4x}{(1-x+x^2)^2}$$

1) б) $y=\frac{1}{x}+\frac{1}{\sqrt{x}}+\frac{1}{\sqrt[3]{x}}$

$$y'=\left(\frac{1}{x}\right)'+\left(\frac{1}{\sqrt{x}}\right)'+\left(\frac{1}{\sqrt[3]{x}}\right)'=(x^{-1})'+(x^{-\frac{1}{2}})'+(x^{-\frac{1}{3}})'=$$

$$=-x^{-2}-\frac{1}{2\sqrt[3]{x^2}}-\frac{4}{3\sqrt[3]{x^4}}$$

1) F)
$$y'=\left(\arcsin\frac{1-x^2}{1+x^2}\right)'=\frac{1}{\sqrt{1-\left(\frac{1-x^2}{1+x^2}\right)^2}}\cdot$$

$$\cdot\frac{-2x(1+x^2)-(1-x^2)\cdot 2x}{(1+x^2)^2}=\frac{-4x}{\sqrt{1-\left(\frac{1-x^2}{1+x^2}\right)^2}\cdot(1+x^2)^2}$$

g) $y = \ln\left(e^x + \sqrt{1+e^{2x}}\right)$

$$y' = \left(\ln\left(e^x + \sqrt{1+e^{2x}}\right)\right)' = \frac{\left(e^x + \sqrt{1+e^{2x}}\right)'}{e^x + \sqrt{1+e^{2x}}} =$$

$$= \frac{e^x + \left(\sqrt{1+e^{2x}}\right)'}{e^x + \sqrt{1+e^{2x}}} = \frac{e^x + \frac{1}{2\sqrt{1+e^{2x}}} \cdot 2e^{2x}}{e^x + \sqrt{1+e^{2x}}} =$$

$$= \frac{e^x + \frac{e^{2x}}{\sqrt{1+e^{2x}}}}{e^x + \sqrt{1+e^{2x}}}$$

h) $y = (x-a_1)^{\alpha_1}(x-a_2)^{\alpha_2} \dots (x-a_n)^{a_n}$

$$\log ab = \log a + \log b$$

$$\log y = \sum_{i=1}^{n} \log (x-a_i)^{\alpha_i}$$

$$\frac{1}{y} \cdot y' = \sum_{i=1}^{n} \frac{1}{(x-a_i)^{\alpha_i}} \cdot \alpha_i \cdot (x-a_i)^{\alpha_i - 1} =$$

$$= \sum_{i=1}^{n} \frac{\alpha_i}{x-a_i}$$

$$y' = y \cdot \sum_{i=1}^{n} \frac{\alpha_i}{x-a_i}$$

c) $y = \sqrt{\frac{1+x^3}{1-x^3}}$

$$y' = \left(\sqrt{\frac{1+x^3}{1-x^3}}\right)' = \frac{1}{3}\left(\frac{1+x^3}{1-x^3}\right)^{-\frac{2}{3}} \cdot \left(\frac{1+x^3}{1-x^3}\right)' =$$

$$= \frac{1}{3 \cdot \sqrt[3]{\left(\frac{1+x^3}{1-x^3}\right)^2}} \cdot \frac{3x^2 \cdot (1-x^3) - (1+x^3)(-3x^2)}{(1-x^3)^2} =$$

$$= \frac{1}{3\sqrt[3]{\left(\frac{1+x^3}{1-x^3}\right)^2}} \cdot \frac{6x^2}{(1-x^3)^2}$$

d) $y = \sin[\sin(\sin x)]$

$y' = (\sin[\sin(\sin x)])' = \cos(\sin(\sin x)) \cdot (\sin(\sin x))' =$

$= \cos(\sin(\sin x)) \cdot \cos(\sin x) \cdot (\sin x)' =$

$= \cos(\sin(\sin x)) \cdot \cos(\sin x) \cdot \cos x$