Домашнее задание №4 по матану

|Упр 2| а) $ye^{xy} = f(x,y)$

$z - f(a,b) = f_x(a,b)(x-a) + f_y(a,b)(y-b)$

$z - be^{ab} = f_x(a,b)(x-a) + f_y(a,b)(y-b)$

$f_x(x,y) = y\cdot(e^{xy})' = y\cdot(xy)'\cdot e^{1\cdot(xy)} =$

$y\cdot y\cdot e^{xy} = \underline{y^2\cdot e^{xy}}$

$f_y(x,y) = y'\cdot(e^{xy}) + y\cdot(e^{xy})' =$

$1\cdot e^{xy} + y\cdot(xy)'\cdot e^{1\cdot(x\cdot y)} =$

$e^{xy} + y\cdot x\cdot e^{xy} =$

$\underline{e^{xy} + xy\cdot e^{xy}}$

$z - be^{ab} = b^2\cdot e^{ab}\cdot(x-a) + (e^{ab} + ab\cdot e^{ab})(y-b)$

б) $(-0{,}1;\ 1{,}1) \approx (0,1)$

$f(x,y) \approx f(0,1) + 1^2\cdot e^0\cdot(x-0) + (e^0 + 0\cdot e^0)(y-1)$

$\underline{1e^0 = 1}$

$1 + 1\cdot 1\cdot x + 1(y-1) \approx x + 1 + y - 1 \approx x + y \approx f(-0{,}1;\ 1{,}1) \approx 1$

|упражнение 3|

$f(x,y) = \sin(x+y) - \cos(x^2)$ в точке $(0,0)$

$f(x,y) = f(0,0) + (f_x(0,0)(x-0) + f_y(0,0)(y-0))$

$+\frac{1}{2}!(f_{xx}(0,0)\cdot(x-0)^2 + 2f_{xy}(0,0)(x-0)\cdot(y-0) +$

$+ f_{yy}(0,0)(y-0)^2) + R_2$

1) $f(0,0) = \sin(0+0) - \cos(0^2) = \sin 0 - \cos 0 = 0 - 1 = (-$

2) $f_x(x,y) = (x+y)' \cdot \sin'(x+y) - (x^2)' \cdot \cos'(x^2) =$

$1 \cdot \cos(x+y) + 2x \cdot \sin x^2$

$f_x(0,0) = \cos(0+0) + 2\cdot 0 \cdot \sin 0^2 = 1$

3) $f_y(x,y) = (x+y)' \cdot \sin'(x+y) = 1 \cdot \cos(x+y)$

$f_y(0,0) = \cos 0 = 1$

4) $f_{xx}(x,y) = (x+y)' \cdot \cos'(x+y) + 2 \cdot \sin x^2 + 2x \cdot$

$(x^2)' \sin'(x^2) = -\sin(x+y) + 2\sin x^2 + 2x \cdot 2x \cdot$

$\cos x^2$

$f_{xx}(0,0) = -\sin 0 + 2\sin 0 + 2\cdot 0 \cdot 2 \cdot 0 \cdot \cos 0^2 = 0$

5) $f_{xy}(x,y)=(x+y)' \cdot \cos'(x+y)=1\cdot(-\sin(x+y))$

$f_{xy}(0,0)=-\sin 0=0$

6) $f_{yy}(x,y)=(x+y)' \cdot \cos'(x+y)=1\cdot(-\sin(x+y))$

$f_{yy}(0,0)=-\sin 0=0$

Получим: $f(x,y)=(-1)+1x+1\cdot y+\frac{1}{2}\cdot 0\cdot x^2+2\cdot 0\cdot xy+$

$0\cdot y^2+R_2=(-1)+x+y+R_2$