Will Legg

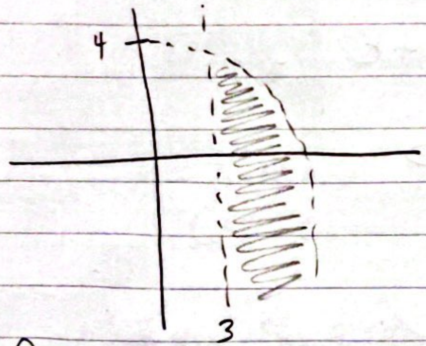
Test II

1) $f(x,y) = 3 + \ln(4-x^2-y)$

Domain: $3 + \ln(v)$ $\qquad$ $\ln(v) > 0$

$4-x^2-y > 0$

$y < -x^2+4$



Range: $f(t) = \ln(t) \rightarrow$ Range $(-\infty, \infty)$ if $t \in (0, \infty)$

$\boxed{\text{Range: } (-\infty, \ln(4))}$

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$F(x,y,z) = \langle x-y^2, y-z^2, z-x^2$

2) $F = \langle P, Q, R \rangle$ $\quad \int P\,dx + Q\,dy + R\,dz$

$= \int F \cdot r'(t)\,dt$

$\int (x-y^2)\,dx + (y-z^2)\,dy + (z-x^2)\,dz$

$= 1 + c \qquad = 1 + c \qquad = 1 + c$

$r(t) = \langle 0,1,2 \rangle + t\langle -1,0,1 \rangle$
$t \in [0,1]$

$= \langle -t, 1, 2+t \rangle$

$\int_0^1 \langle -t, 1, 2+t \rangle \cdot \langle -1, 0, 1 \rangle$

$= \int \langle t, 0, 2+t \rangle = \langle \frac{1}{2}t^2, 0, 2t + \frac{1}{2}t^2$

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3 $f(x,y) = \frac{7x+19y}{x}$

$\nabla f = \langle f_x, f_y \rangle = \left\langle \frac{7x-(7x+19)}{x^2}, \frac{7x+19}{x} \right\rangle$

$\nabla f(1,6) = \langle 19, 26 \rangle$

$|\nabla f(1,6)| = \sqrt{19^2+26^2}$ $\boxed{\approx 32.202}$

4 $x = u+2v \quad y = 6u^2 \quad z = 3u-v$

$(5,6,1)$

$u+2v=5 \rightarrow u = -2(3u-1)+5 \rightarrow u = -6u+7$

$3u-v=1 \rightarrow v = 3u-1 \qquad u = 1$

$v = 2(1)-1 \rightarrow 1$

$\vec{r}_u = \langle 1, 12u, 2 \rangle = r(1,1) = \langle 1, 12, 2 \rangle$

$\vec{r}_v = \langle 2, 0, -1 \rangle = r(1,1) = \langle 2, 0, -1 \rangle$

$\vec{n} = r_u \times r_v = \begin{vmatrix} i & j & k \\ 1 & 12 & 2 \\ 2 & 0 & -1 \end{vmatrix} = \begin{array}{l} i(-12-0) \\ -j(-1-4) \\ +k(0-24) \end{array}$

$= \langle -12, -5, -24 \rangle$

$a+b \rightarrow (-12)+(-5) = -17$

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