MA 1024. HOMEWORK 4
DUE: FRIDAY APRIL 11

Assigned Problems:

Section 12.10: 2, 8, 10, 18, 24

Section 13.1: 4, 6, 12, 16, 24, 26, 32

Recommended Problems: (only hand in the subset listed above)

Section 12.10: 1 – 25

Section 13.1: 1 – 34

MA 1024 HOMEWORK 4 SOLNS.

12.10

(18) $f(x,y) = 8xy - 2x^2 - y^4$

$f_x(x,y) = 8y - 4x$

$f_y(x,y) = 8x - 4y^3$

so $f_x = 0 \Rightarrow 4x = 8y$ or $8x = 16y$.

substituting into $f_y = 0$ we find:

$16y - 4y^3 = 0$

$4y(4 - y^2) = 0 \Rightarrow y = 0$ or $y = \pm 2$.

critical pts are $(0,0)$, $(4,2)$ and $(-4,-2)$.

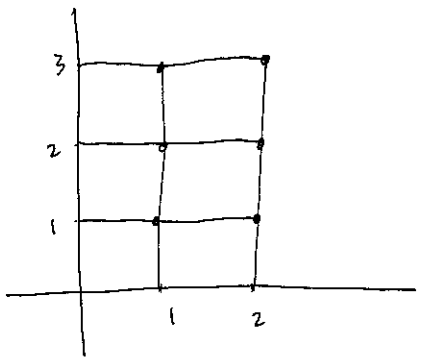
$f_{xx} = -4 = A$

$f_{xy} = 8 = B$

$f_{yy} = -12y^2 = C$.

CRIT PTS	A	B	C	Δ	Type of extremum
$(0,0)$	-4	8	0	-64	saddle
$(4,2)$	-4	8	-48	128	local max
$(-4,-2)$	-4	8	-48	128	"

(6)



upper right corners are :

$(1,1), (2,1), (1,2), (2,2), (1,3), (2,3)$.

area of each square is $\Delta A_i = 1$.

So $\iint_R x^2+y^2 \, dA \approx \sum_{i=1}^{6} f(x_i^*, y_i^*) \Delta A_i$

$= f(1,1) + f(2,1) + f(1,2) + f(2,2) + f(1,3) + f(2,3)$

$= 2 + 5 + 5 + 8 + 10 + 13$

$= 43.$

(24) $\int_0^1 \int_0^1 e^{x+y} \, dx \, dy = \int_0^1 \left[e^{x+y} \right]_0^1 dy = \int_0^1 e^{1+y} - e^y \, dy$

$= \left[e^{1+y} - e^y \right]_0^1 = \left(e^2 - e\right) - \left(e^1 - 1\right)$

$= e^2 - 2e - 1$

$= (e-1)^2.$

(32) ① $\int_{-\pi/2}^{\pi/2} \int_0^{\pi} \sin x \cos y \, dx \, dy = \int_{-\pi/2}^{\frac{\pi}{2}} \left[-\cos x \cos y \right]_0^{\pi} dy = \int_{-\pi/2}^{\pi/2} 2\cos y \, dy = \left[2\sin y \right]_{-\frac{\pi}{2}}^{\frac{\pi}{2}} = 4$

② $\int_0^{\pi} \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin x \cos y \, dy \, dx = \int_0^{\pi} \left[\sin x \sin y \right]_{-\frac{\pi}{2}}^{\frac{\pi}{2}} dx = \int_0^{\pi} 2\sin x \, dx = \left[-2\cos x \right]_0^{\pi} = 4.$