Name: SOLUTIONS

Quiz #7 - October 22, 2004

1. Find the maximum and minimum values of the function

$$f(x,y) = 2x^2 + 3y^2 - 4x - 5$$

on the region given by the inequality $x^2 + y^2 \leq 16$.

$\nabla f = (4x-4, 6y)$

so $(1,0)$ is only C.P.

$\nabla g = (2x, 2y)$, use L.MULT. on boundary,

$4x - 4 = 2x\lambda$

$6y = 2y\lambda \Rightarrow y = 0$ or $\lambda = 3$

If $y = 0$ then $x = \pm 4$

If $\lambda = 3$ then $4x - 4 = 6x \Rightarrow x = -2$

and $y = \pm\sqrt{12}$

	$f(x,y)$
$(1,0)$	-7
$(4,0)$	11
$(-4,0)$	43
$(-2,\sqrt{12})$	47
$(-2,-\sqrt{12})$	47

max value 47

min -7

2. Calculate the double integral

$$\iint_R \cos(x + 2y)\,dA$$

over the rectangle $R : \{0 \leq x \leq \pi,\ 0 \leq y \leq \pi/2\}$

$$\int_0^{\pi}\int_0^{\pi/2} \cos(x+2y)\,dy\,dx = \int_0^{\pi} \tfrac{1}{2}\sin(x+2y)\Big|_{y=0}^{\pi/2} dx$$

$$= \int_0^{\pi} \tfrac{1}{2}\sin(x+\pi) - \tfrac{1}{2}\sin x \, dx$$

$$= -\tfrac{1}{2}\cos(x+\pi) + \tfrac{1}{2}\cos x \Big|_0^{\pi}$$

$$= \left(-\tfrac{1}{2} - \tfrac{1}{2}\right) - \left(\tfrac{1}{2} + \tfrac{1}{2}\right) = -2$$