MAS117 Mathematics II
Final Examination
23 May 2006 0900-1200
Dr. Ruben Mera

Instructions

1. Exam contains 5 questions and all are compulsory
2. Calculator and other electronic devices are not allowed
3. Textbooks and notes are not allowed
4. You must show all necessary detailed steps to obtain full credit in each question
5. Please, write your final answer in the reserved space

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1. Use Lagrange multipliers to find extrema (maximum and minimum values) of $f(x,y) = x - 3y - 1$ subject to the condition $x^2 + 3y^2 = 16$. Find also at which points these extrema occur.

maximum value is ___________
max. occurs at the point(s) ___________
minimum value is ___________
min. occurs at the point(s) __________

2. Find the area enclosed by the curves $x^2 - y - 2 = 0$ and $x - y = 0$

3. . Evaluate $\iint_R x^2 y\, dA$ where R is the triangle of vertices (0,0) (2,3), (3, 0)

4. Find the volume of the solid in the first octant, under the surface $f(x,y) = x^2 + xy$, bounded by the three coordinate planes and the plane $6x + 2y = 2$.

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MAS117 Mathematics II
Final Examination
Dr Anotai Suksangpanomrung

Instructions

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3. Textbooks and lecture notes are not allow in the examination room
4. The student must <u>shows details calculation</u> in order to obtain a full mark in each question

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1. (Triple Integral)

Evaluate the integral of $\int_0^2 \int_{-1}^{y^2} \int_{-1}^{z} yz \; dxdzdy$

2. (Line Integral)

Let *C* be the curve represented by the equations x = 4t, y = 3t, $0 \le t \le 1$

Evaluate

2.1 $\int_c (x-y)ds$ **2.2** $\int_c (x-y)dx$ 2.3 $\int_c (x-y)dy$

3. (Line Integral) Find the value of line integral of $\int_C f(x,y)\,dx + g(x,y)\,dy$

When $f(x,y) = (x - y)$, $g(x,y) = x$

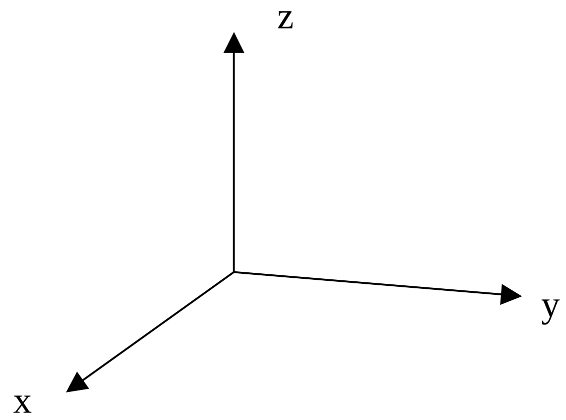
and $\boldsymbol{C}(t) = (\sin t)\mathbf{i} + (\cos t)\mathbf{j}$, $0 \le t \le 2\pi$

4. (Triple Integral)

Sketch the solid volume in x-y-z coordinate and find the upper limit of the triple integral of

$$\iiint_G z dV ,$$

where G is the solid in the first octant that is bounded by the parabolic cylinder $z = 2 - x^2$ and the planes y = x, y = 0 and z = 0.



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4.1 $\int_0^c \int_0^b \int_0^a z \ dzdydx$

a = ______________________

b = ______________________

c = ______________________

4.2 $\int_0^g \int_0^f \int_0^d z \ dydxdz$

d = ______________________

f = ______________________

g = ______________________

5. (Green's Theorem)
From the Green's theorem $\oint_C M\,dx + N\,dy = \iint_R \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right) dx\,dy$

Evaluate the $\oint_c y^2 dx + x^2 dy$ using the above Green's theorem, where *C*: the triangle bounded by x = 0, y = 0 and x + y = 1

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