



Prince Sultan University
Department of Mathematics and Physical Sciences

Math 215
First Midterm Exam
Semester I, Term 131
Thursday, November 7, 2013

Time Allowed: 80 minutes

Name:

Student Number:

Grading Policy:

Questions	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6	Q.7	Total
Student's Mark								
Maximum Mark	4	4	5	5	6	5	11	40

Statement of Ethics:

I agree to complete this exam without unauthorized assistance from any person, materials, or device.

Signature:

Question.1 (4 pts.) Find the limit, if it exists, or show that the limit does not exist:

$$\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 y e^y}{x^4 + 4y^2}$$

Question.2 (4 pts.) Find an equation for the tangent plane to the surface $z = x \sin(x + y)$, at $(-1, 1, 0)$.

Question.3 (5 pts.) Let $u = x e^{ty}$, $x = \alpha^2 \beta$, $y = \beta^2 \alpha$, $t = \gamma^2 \alpha$. Find $\frac{\partial u}{\partial \alpha}$, $\frac{\partial u}{\partial \beta}$ when $\alpha = -1$, $\beta = 2$, $\gamma = 1$.

Question.4 (5 pts.) Find the local maximum and minimum values and saddle points of the function $f(x, y) = 9 - 2x + 4y - x^2 - 4y^2$.

Question.5 (6 pts.) Find the volume of the solid under the plane $x - 2y + z = 1$ and above the region bounded by $x + y = 1$ and $x^2 + y = 1$.

Question.6 (5 pts.) Evaluate the iterated integral $\int_0^1 \int_0^1 \int_0^{\sqrt{1-z^2}} \frac{z}{y+1} \, dx dz dy$

Question.7 (3+4+4 pts.) Convert the following integrals:

a) $\int_{-3}^3 \int_0^{\sqrt{9-x^2}} \sin(x^2 + y^2) dy dx$ to polar coordinates.

b) $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_{x^2+y^2}^{2-x^2-y^2} (x^2 + y^2)^{3/2} dz dy dx$ to cylindrical coordinates.

c) $\int_{-2}^2 \int_0^{\sqrt{4-x^2}} \int_0^{\sqrt{4-x^2-y^2}} (x^2 + y^2 + z^2) \, dz dy dx$ to spherical coordinates.