



Prince Sultan University
Department of Mathematics and Physical Sciences

Math 215
First Midterm Examination
Semester I, Term 121
Thursday, November 8, 2012

Time Allowed: 80 minutes

Name:

Student Number:

Important Instructions

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Looking around or making an attempt to cheat will result in your exam being cancelled.
6. This examination has 5 problems, some with several parts. Make sure your paper has all these problems.

Grading Policy:

Questions	Q.1	Q.2	Q.3	Q.4	Q.5	Total
Student Marks						
Maximum Marks	15	15	20	12	18	80

Q.1 (8+7 points) Evaluate the following limits if they exist:

a) $\lim_{(x,y) \rightarrow (1,2)} \frac{xy - 2x - y + 2}{x^2 - 2x + y^2 - 4y + 5}.$

b) $\lim_{(x,y) \rightarrow (0,0)} \frac{2x^2 \sin y}{2x^2 + y^2}.$

Q.2 (3+12 points) Consider the function $f(x, y) = \ln(x^2 + y^2 - 9) + 5e^{2xy}.$

a) Describe the domain of f .

b) Find f_x and f_{xy} . Is $f_{xy} = f_{yx}$? Justify your answer.

Q.3 (10+10 points)

a) Compute the area of the region bounded by $y = 2x, y = 3 - x, y = 0$.

b) Find the surface area of the portion of the paraboloid $z = 4 - x^2 - y^2$ above xy -plane.

Q.4 (12 points) Evaluate $\iiint_Q f(x, y, z) dV$ where $f(x, y, z) = 3x - 2y$ and Q is the tetrahedron bounded by $4x + y + 3z = 12$ and the coordinate planes.

Q.5 (6+6+6 points)

a) Convert the double integrals $\int_0^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} e^{-x^2-y^2} dy dx$ to polar coordinates.

b) Convert the triple integrals $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_0^{\sqrt{x^2+y^2}} 3z^2 dz dy dx$ to cylindrical coordinates.

c) Convert the triple integrals $\int_{-2}^2 \int_0^{\sqrt{4-x^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{8-x^2-y^2}} (x^2 + y^2 + z^2)^{3/2} dz dy dx$ to spherical coordinates.