CALCULUS 3
FINAL EXAM

2012

University of Jordan
Department of Mathematics

Final Exam Math.: 0301201 02/08/2012

Name: ..... Number: ..... Section: .....

Q_1) $\vec{a}$ & $\vec{b}$ are two vectors such that $|\vec{a}|=2, |\vec{b}|=5$ & $\vec{a}.\vec{b}=6$.

Find $|\vec{a}\times(-3)\vec{b}|$.

Q_2) Let $z=f(x,y)$, $x=st^2$, $y=3st$. Find $\frac{\partial^2 z}{\partial s \partial t}$.

* Consider the curve $C:\vec{r}(t)=\hat{i}+t\hat{j}+2t^2\hat{k}$ & the surface $S:z=x^2+y^2$. Answer questions 3&4.

Q_3) Find the curvature of the curve at the point $Q(1,-1,2)$.

Q_4) i) Write an equation of the normal line to the given surface S at the point Q.

ii) Find an equation of the plane containing the tangent to the curve C & the normal to the surface S at the point Q.

Q_5) i) Find the $\lim_{(x,y)\to(0,0)} \frac{xy^2e^{2x}}{3x^2+y^4}$ if exists, or show that it does not exist.

ii) Use linear approximation to show that $e^x \sin y \cong y$ at $(0, 0)$.

Q_6) Using lagrange find the point on the cylinder $x^2 + y^2 = 45$, that is closest to the point $(1, 2, 0)$.

Q_7) Reverse the order of integration $\int_0^3 \int_1^{\sqrt{y+1}} f(x,y)\,dxdy$.

Q_8) Convert to polar (Don't evaluate) $\int_0^4 \int_x^4 e^{x^2+y^2}\,dydx$.

Q_9) Using cylindrical coordinates, find the volume of the solid below the paraboloid $z = 3 - x^2 - y^2$ & above the plane $z = 2$, in the first octant.

Q_{10}) Using spherical coordinates, set up (don't evaluate)

$\iiint_D (x+z)\,dV$, where D is the solid region outside the cone $z = \sqrt{3x^2 + 3y^2}$, inside the sphere $x^2 + y^2 + z^2 = 4$ & above the XY – plane.