Math 042

Review for Midterm 1.

1. Find the $u_x(1,1)$, $u_y(1,1)$ if $x \sin u(x,y) + y(u(x,y))^2 = x^2 - 1$ and u(1,1) = 0. 2. Plot level curves for the function $z = f(x,y) = 4x^2 - y^2$. Plot the level surfaces of the function $f(x,y,z) = x^2 + y^2 + 4z^2$.

3. If a kid blows a balloon at 2 in³ per second. Find the rate of change of the volume if you assume the balloon always assume the shape of a ball.

4. Find the directional derivative of $f(x, y, z) = x^2 + 2xy + 4yz$ in the direction of i + j + k.

What is physical meaning of this derivative?

5. Compute: $(x^{y^2+zx})_x$ and $(x^{y^2+zx})_{xy}$.

6. Find tangent, normal vector and curvature of the curve: $t\mathbf{i}+t\mathbf{j}+t^2\mathbf{k}$.

7. A particle's acceleration is according to $a(t) = t\mathbf{i}-t\mathbf{j}+t^2\mathbf{k}$. Find all its possible vector-valued position function.

8. Find parameterizations of the curves

$$x^2 + 5y^2 = 8.$$

9. Give a function so that it is continuous at (0,0) by not differentiable. Give a function so that it isn't continuous at (0,0).

10. Find tangent line of the curve defined as x + sin(x + y - 2) = x - y + 2, at the point (0, 2).