TOPICS - EXAM # 1

1. Level curves, level surfaces; sketching surfaces using level curves.

2. Definition of limit; computing limits using the Limit Theorem, Squeeze Theorem or Continuity of Composition Theorem; showing a limit does not exist; continuous functions.

3. Partial derivatives; gradient of $f : \mathbb{R}^n \to \mathbb{R}$; tangent planes to surfaces; (linear) approximation formula.

4. Derivative of a function $f : \mathbb{R}^n \to \mathbb{R}^m$; differentiability of such a function; properties of derivatives.

5. Paths $\vec{c}(t)$; velocity, speed; tangent vector.

6. CHAIN RULE; implicit differentiation.

7. Directional derivative $D_{\vec{u}} f(\vec{x})$ ($\vec{u}$ must be a unit vector); basic properties of directional derivatives; rate of change of $f$ along a path $\vec{c}(t)$; $\nabla f$ is normal to corresponding level set of $f$.

8. Iterated and mixed partial derivatives; 1st Order Taylor’s Theorem.

9. Critical points of functions of several variables and local extrema.