Math 251 EXAM 1 Concepts to know

To prepare to the test you have to review all topics discussed in class (Sections 11.1-11.6, 12.1-12.5.) focusing on the topics below:

- Length of a vector, unit vector, dot product and its properties, angle between two vectors (11.1-11.2)

- Cross product and its properties, scalar triple product (11.3)

- Vector and parametric equations of a line; direction vector.(11.4)

- Line as intersection of two nonparallel planes.(11.4)

- Equation of plane; normal vector; parallel planes; orthogonal planes; angle between two planes.(11.4)

- Quadric surfaces (standard equations of ellipsoid, paraboloid, cone and cylindric surfaces; sketch the graph, complete square method).(11.5)

- Vector functions: component functions, domain of definition, derivative.(11.6)

- Space curve, tangent vector and tangent line.(11.6)

- Functions of two variables, domain of definition, graph, level curves.(12.1)

- Functions of three variables, domain of definition, level surfaces.(12.1)

- Partial derivatives of first and second orders. High order partial derivatives. (12.3)

- Equation of a tangent plane to the graph of $z = f(x, y)$ (or, to a surface $z = f(x, y)$). Normal vector to this tangent plane. Normal line equations.(12.4)

- Differential (applications: use differential to find an approximate value of an expression and to estimate the maximum error).(12.4)

- The Chain Rule (application: "rate problem").(12.5)

- Implicit differentiation (case $F(x, y, z) = 0$).(12.5)