Here is a list of review topics for the final exam:

Linear Transformations; e. g. rotations
The matrix of a transformation. Composition of transformations and multiplication of matrices
Invertible transformations
Dot Product, Schwartz Inequality, Cross Product in $\mathbf{R}^3$
Norms of vectors and of linear transformations, operator norms
Open and closed sets and neighbourhoods
Limits of sequences and of functions, continuity
Composition of functions and continuity
Partial and Directional Derivatives, Differentiable functions
Differentiability implies continuity
Every linear transformation on $\mathbf{R}^n$ is continuous
Geometric series of matrices, $|A| < 1$ or $||A|| < 1$ implies

$$(I - A)^{-1} = \sum_{n=0}^{\infty} A^n$$

The set of invertible linear transformations is open in the set of all transformations
A closed bounded subset of $\mathbf{R}^n$ is compact
A function on a compact set attains maximum and minimum values
A sequence in a compact set has a convergent subsequence
Partial derivatives of a function give the matrix of the linear transformation which is its derivative
The map which takes A into A^{-1} is differentiable. Compute its derivative
Rules for computing derivatives: sums, products, compositions, bi-linear functions
Mean value theorem for $f : \mathbf{R}^n \to \mathbf{R}$
A function with continuous partial derivatives is differentiable. Prove it.
A function whose derivative is bounded is Lipschitz.
Newton's method of solving equations and the inverse function theorem which comes from it.
The contraction lemma, and using it to prove an inverse function theorem without Newton's method.
Comparason of Newton's method with the iteration which uses the contraction lemma.
O(3), SO(3), O(n), SO(n), Square roots of some matrices
Parametrization of O(n) given by the implicit function theorem.
Proof that $||A|| = ||A^t||$
Quadratic forms on $\mathbf{R}^n$.
Taylor polynomials and Taylor's Theorem for functions of n variables
Classification of critical points of functions on $\mathbf{R}^n$.