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In this talk, we present a generalized multiplicative Hardy-Littlewood-Polya type inequality, as well as several related additive inequalities, for functions of operators in Hilbert spaces. In addition, we find the modulus of continuity of a function of an operator on a class of elements defined with the help of another function of the operator. We then apply the results to solve the following problems: (i) the problem of approximating a function of an unbounded self-adjoint operator by bounded operators, (ii) the problem of best approximation of a certain class of elements from a Hilbert space by another class, and (iii) the problem of optimal recovery of an operator on a class of elements given with an error. (Received September 20, 2016)