ABSTRACT: For various physical models, we show that the ratio $E(N)/P(N)$ of the ground state energy $E(N)$ and some polynomial $P(N)$ grows monotonically in N. For classical Newtonian N body systems with pair interactions which are bounded below, $P(N) = N(N-1)$, while for bosonic atoms and stars $P(N)$ is some third-order polynomial. We also discuss applications of these monotonicity results.