The polynomial $6x^3+ax^2+bx+9$ is denoted by $\mathrm{p}(x)$, where a and b are constants. It is given that $(x-3)$ is a factor of $\mathrm{p}(x)$, and when the first derivative $\mathrm{p}'(x)$ is divided by $(x-3)$ the remainder is 72.

(a) Find the values of a and b. [5]

(b) When a and b have the values found in part **(a)**, factorise $\mathrm{p}(x)$ completely. [3]

(c) Hence solve the inequality $\mathrm{p}(x) < 0$. [2]