3. $\mathrm{f}(x) = x^3 - (k + 4)x + 2k$, where k is a constant.

(a) Show that, for all values of k, the curve with equation $y = \mathrm{f}(x)$ passes through the point $(2, 0)$.

(1)

(b) Find the values of k for which the equation $\mathrm{f}(x) = 0$ has exactly two distinct roots.

(5)

Given that $k > 0$, that the x-axis is a tangent to the curve with equation $y = \mathrm{f}(x)$, and that the line $y = p$ intersects the curve in three distinct points,

(c) find the set of values that p can take.

(5)