9. The first three terms of a geometric sequence are

$$3k + 4 \qquad 12 - 3k \qquad k + 16$$

where $k$ is a constant.

(a) Show that $k$ satisfies the equation

$$3k^2 - 62k + 40 = 0$$

**(2)**

Given that the sequence converges,

(b) (i) find the value of $k$, giving a reason for your answer,

(ii) find the value of $S_\infty$

**(5)**