STEP/Algebra: Exercises - Overview (13/6/23)

Q1

Solve the equation $x - \sqrt{x} = 6$

Q2

Solve the equation $\sqrt{2x + 3} + \sqrt{x + 1} = \sqrt{7x + 4}$

Q3

Given that $\frac{bc - a}{1 - c} = 7$ & $\frac{b^2 c - a^2}{1 - c} = 51$,

show that $\frac{a + 7}{a^2 + 51} = \frac{b + 7}{b^2 + 51}$

Q4

If $\gamma = \frac{1}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}$, $\phi = \frac{1}{\sqrt{1 - \left(\frac{u}{c}\right)^2}}$ and $w = \frac{u + v}{1 + \frac{uv}{c^2}}$,

show that $\left(1 + \frac{uv}{c^2}\right) \gamma \phi = \frac{1}{\sqrt{1 - \left(\frac{w}{c}\right)^2}}$

Q5

(i) Find an expansion for $(a + b + c)^3$, and give a justification for the coefficients.

(ii) Extend this to $(a + b + c)^4$