

STEP Problems - Algebra (1 page; 6/9/18)

(1) Show that $\frac{\sec\theta+1-\tan\theta}{\sec\theta+1+\tan\theta} \equiv \sec\theta - \tan\theta$

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

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

(4) Express the following parametric equations in Cartesian form (ie a relation between x & y).

(i) $x = 2t + t^2$, $y = 2t^2 + t^3$

(ii) $x = 5t^2 - 4$, $y = 9t - t^3$

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

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

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

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

$(a_1 + a_2 + \dots + a_m)^n$