1. The hyperbola H has equation

$$\frac{x^2}{4} - \frac{y^2}{3} = 1$$

(a) Use calculus to show that an equation of the normal to H at the point P with coordinates $\left(2\sec\theta,\ \sqrt{3}\tan\theta\right)$ is

$$2x\tan\theta + \sqrt{3}\,y\sec\theta = k\tan\theta\sec\theta$$

where k is a constant to be determined.

(4)

The normal to H at the point $Q(4, 3)$ meets H again at the point R.

(b) Determine the coordinates of R.

(*Solutions relying entirely on calculator technology are not acceptable.*)

(4)

(Total for Question 1 is 8 marks)