

## **STEP III, 2006, Q1**

- 1 Sketch the curve with cartesian equation

$$y = \frac{2x(x^2 - 5)}{x^2 - 4}$$

and give the equations of the asymptotes and of the tangent to the curve at the origin.

Hence determine the number of real roots of the following equations:

- (i)  $3x(x^2 - 5) = (x^2 - 4)(x + 3)$ ;
- (ii)  $4x(x^2 - 5) = (x^2 - 4)(5x - 2)$ ;
- (iii)  $4x^2(x^2 - 5)^2 = (x^2 - 4)^2(x^2 + 1)$ .



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