

Exercise 7A

Sketch the graph of each of the following functions.

$$1 \quad y = \frac{(x-3)(x-1)}{(x+2)(x-2)}$$

$$2 \quad y = \frac{(2x-1)(x+4)}{(x-1)(x-2)}$$

$$3 \quad y = \frac{(x+4)(x-5)}{(x-2)(x-3)}$$

$$4 \quad y = \frac{(x+1)(2x+5)}{(x+2)(x-5)}$$

$$5 \quad y = \frac{2x^2 + 3x - 5}{x^2 - x - 2}$$

$$6 \quad y = \frac{3x^2 + 4x + 4}{x^2 - 2x - 3}$$

7 Find the range of values of

$$a) \quad y = \frac{4x^2 - x - 3}{2x^2 - x - 3}$$

$$b) \quad y = \frac{x^2 + x - 1}{x^2 + x - 3}$$

8 Find the equations of the three asymptotes of the curve

$$y = \frac{4x^2 - 5x + 7}{21x^2 - x - 10} \quad (\text{OCR})$$

9 Find the equations of the asymptotes of the curve

$$y = \frac{x^2 - x + 1}{x + 1} \quad (\text{OCR})$$

10 One of the two asymptotes of the curve

$$y = \frac{x^2 + \lambda x + 1}{x + 2}$$

where λ is a constant, is $y = x + 5$.

i) State the equation of the other asymptote.

ii) Find the value of λ . (OCR)

11 The curve C has equation

$$y = 10 + \frac{8}{x-2} - \frac{27}{x+2}$$

i) Write down the equations of the asymptotes of C .

ii) Find $\frac{d^2y}{dx^2}$.

iii) Show that C has one point of inflexion, and find the coordinates of this point. (OCR)

12 A curve has equation $y = \frac{x^2 - 5}{x^2 + 2x - 11}$.

a) Determine the equations of the three asymptotes to the curve, giving each answer in an exact form.

b) Prove algebraically that there are no values of x for which $\frac{1}{2} < y < \frac{5}{6}$.

Hence, or otherwise, calculate the coordinates of the turning points on the curve. (AEB 98)

Exercise 7A

7 a) $y \leq 1, y \geq \frac{49}{25}$ b) $y \geq 1, y \leq \frac{5}{13}$ **8** $x = -\frac{2}{3}, x = \frac{5}{7}, y = \frac{4}{21}$ **9** $x = -1, y = x - 2$ **10** i) $x = -2$ ii) 7

11 i) $x = 2, x = -2, y = 10$ ii) $\frac{16}{(x-2)^3} - \frac{54}{(x+2)^3}$ iii) $(10, 8\frac{3}{4})$ **12** a) $y = 1, x = 2\sqrt{3} - 1, x = -1 - 2\sqrt{3}$ b) $(5, \frac{5}{6}), (1, \frac{1}{2})$