Advanced Higher Homework (12)

(1) NAB style Question

$$f(x) = \frac{x^2+6x+12}{x+2}, \quad x \neq -2, \; x \in \mathbb{R}$$

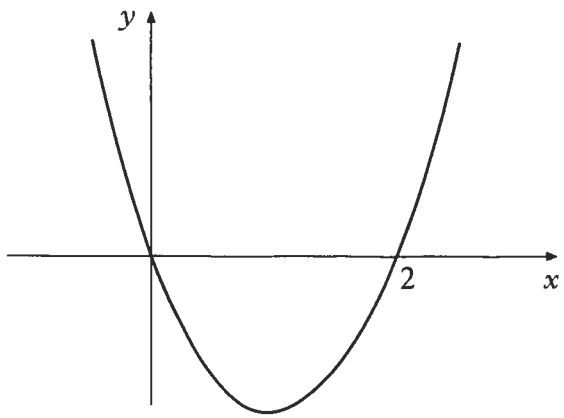
(a) Write down the equation of the vertical asymptote of the graph of $y = f(x)$

(b) Show that the graph has a non-vertical asymptote and write down its equation.

(c) Sketch the graph of $y = f(x)$ showing clearly its intersection with the axes and its turning points with appropriate justification.

(2) Determine whether the function $f(x) = x^4 \sin 2x$ is odd, even or neither.
Justify your answer. [2004]

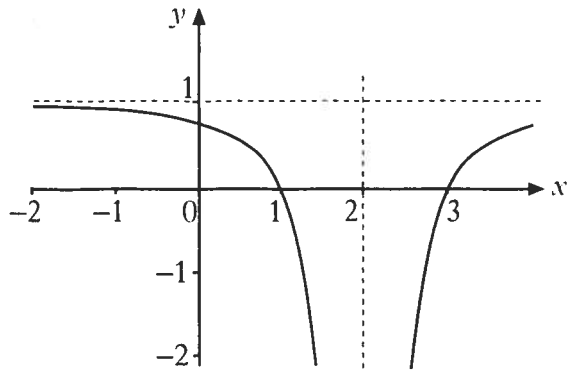
(3) The diagram below shows part of the graph of a function $f(x)$. State whether $f(x)$ is odd, even or neither. Fully justify your answer.



[2010]

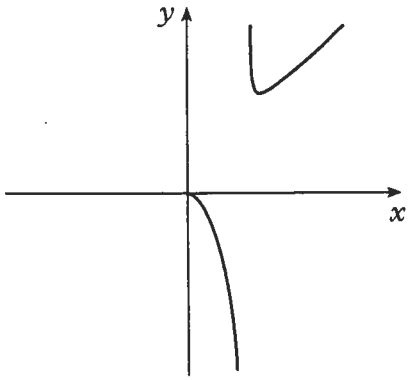
[PTO]

4 Part of the graph $y = f(x)$ is shown below, where the dotted lines indicate asymptotes. Sketch the graph $y = -f(x+1)$ showing its asymptotes. Write down the equations of the asymptotes.



[2008]

5

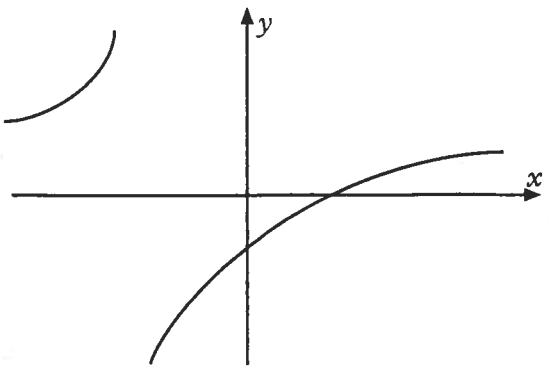


The diagram shows part of the graph of a function f which satisfies the following conditions:

(i) f is an even function;
(ii) two of the asymptotes of the graph $y = f(x)$ are $y = x$ and $x = 1$.

Copy the diagram and complete the graph. Write down equations for the other two asymptotes. [2006]

6 The function f is defined by $f(x) = \dfrac{x-3}{x+2}$, $x \neq -2$, and the diagram shows part of its graph.



(*a*) Obtain algebraically the asymptotes of the graph of f.

(*b*) Prove that f has no stationary values.

(*c*) Does the graph of f have any points of inflexion? Justify your answer.

(*d*) Sketch the graph of the inverse function, f^{-1}. State the asymptotes and domain of f^{-1}.

[2001