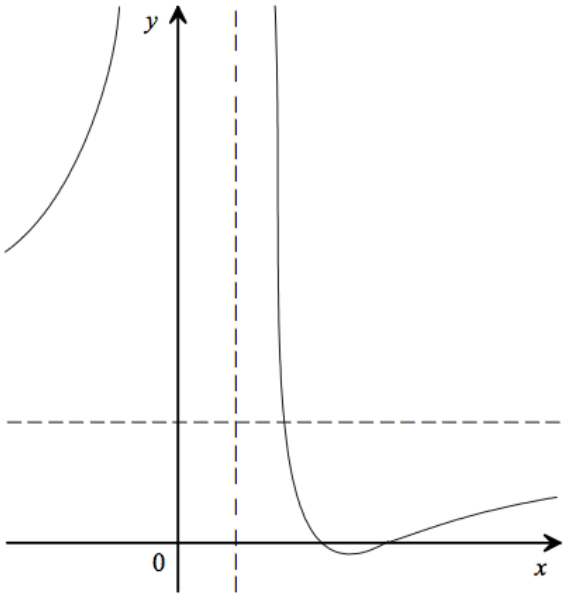
# Rational functions

1)calc

(i) Consider the function $f$ given by $f(x) = \dfrac{2x^2 - 13x + 20}{(x-1)^2}$, $x \neq 1$.

A part of the graph of $f$ is given below.




The graph has a vertical asymptote and a horizontal asymptote, as shown.

(a) Write down the **equation** of the vertical asymptote. *[1 mark]*

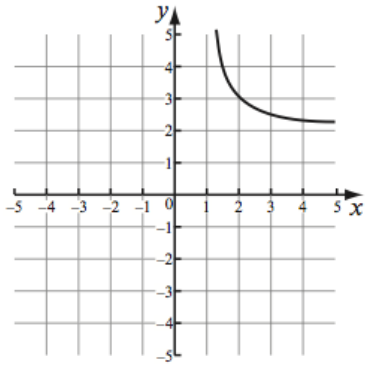
(b) $f(100) = 1.91$, $f(-100) = 2.09$, $f(1000) = 1.99$

(i) Evaluate $f(-1000)$.

(ii) Write down the **equation** of the horizontal asymptote. *[2 marks]*

2)calc

(a) Consider the function $f(x) = 2 + \dfrac{1}{x-1}$. The diagram below is a sketch of part of the graph of $y = f(x)$.




Copy and complete the sketch of $f(x)$. *[2 marks]*

(b) (i) Write down the $x$-intercepts and $y$-intercepts of $f(x)$.

(ii) Write down the equations of the asymptotes of $f(x)$. *[4 marks]*

# Rational functions

3)calc Consider the function $f(x)=\frac{16}{x-10}+8,\ x\neq 10$.

(a) Write down the **equation** of

(i) the vertical asymptote;

(ii) the horizontal asymptote. *[2 marks]*

(b) Find the

(i) $y$-intercept;

(ii) $x$-intercept. *[2 marks]*

(c) Sketch the graph of $f$, clearly showing the above information. *[4 marks]*

4)calc The function $f(x)$ is defined as $f(x)=3+\frac{1}{2x-5},\ x\neq\frac{5}{2}$.

(a) Sketch the curve of $f$ for $-5\leq x\leq 5$, showing the asymptotes. *[3 marks]*

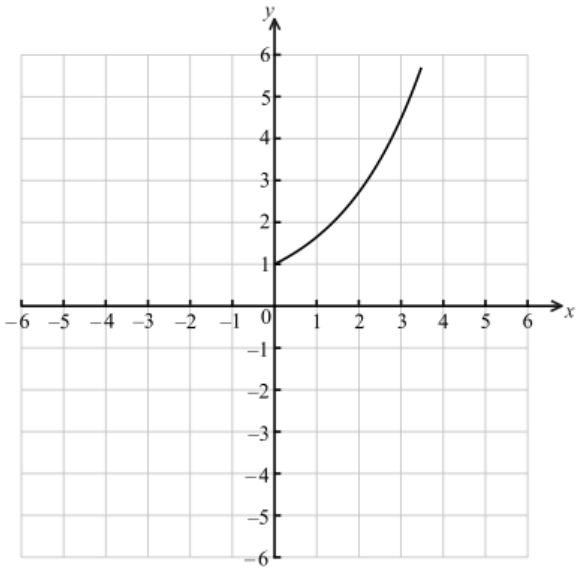
(b) Using your sketch, write down

(i) the equation of each asymptote;

(ii) the value of the $x$-intercept;

(iii) the value of the $y$-intercept. *[4 marks]*

5) Let $f$ be the function given by $f(x) = e^{0.5x}$, $0 \le x \le 3.5$. The diagram shows the graph of $f$.




(a) On the same diagram, sketch the graph of $f^{-1}$. *[3 marks]*

(b) Write down the range of $f^{-1}$. *[1 mark]*

(c) Find $f^{-1}(x)$. *[3 marks]*