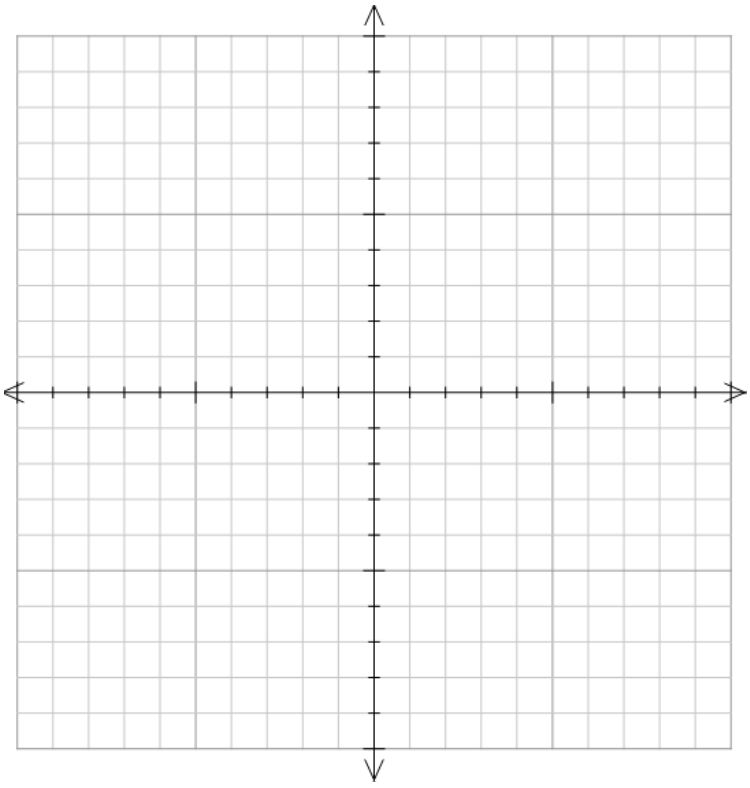
APPLICATIONS INVOLVING GRAPHING FUNTIONS

1 **(a)** Sketch the graph of $y = \dfrac{1}{2x-1}$.

(b) Find the equation of the tangent to the curve at the point where $x = 1$.

(c) Find the equation of the normal to the curve at point where $x = -1$.

(d) Find the coordinates of the point of intersection of the tangent and normal found in parts **(b)** and **(c)**.

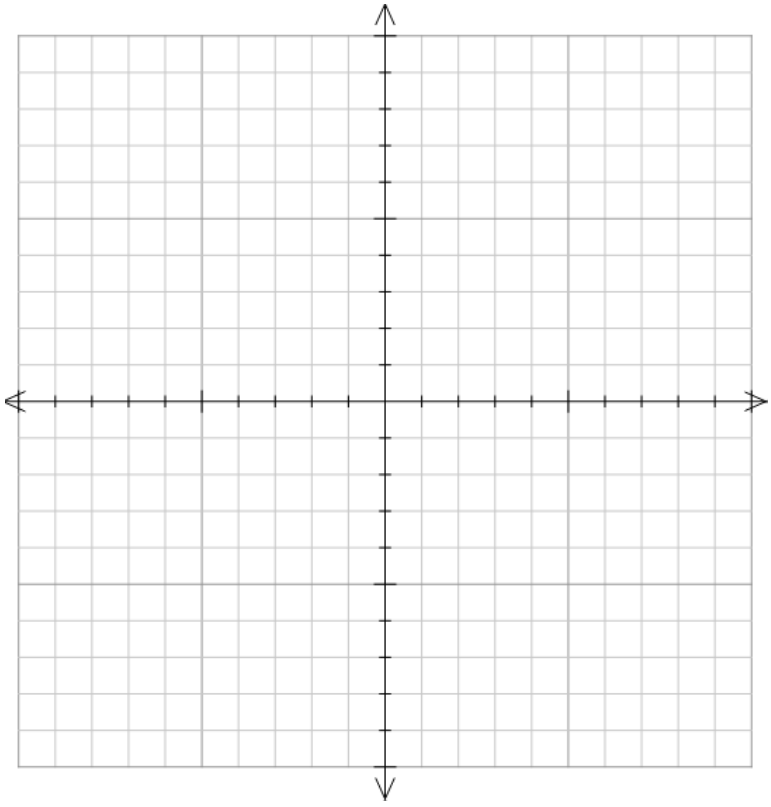


APPLICATIONS INVOLVING GRAPHING FUNTIONS

2 **(a)** Sketch the curve $y = x + \frac{1}{x}$, showing its asymptotes.

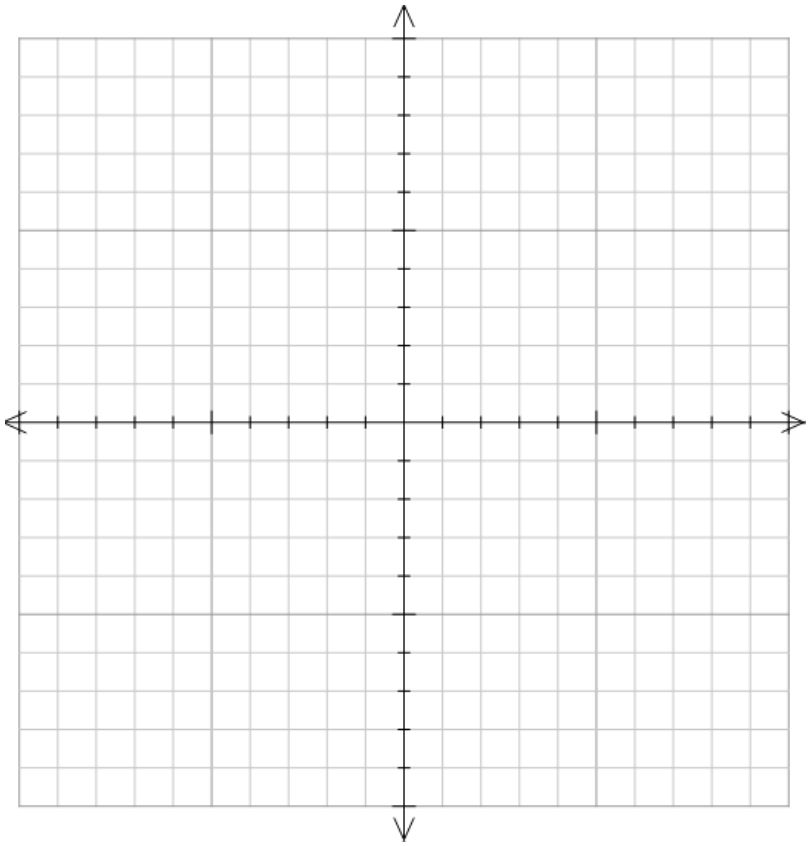
(b) Find the coordinates of the turning points of $y = x + \frac{1}{x}$ and determine their nature.

(c) What is the least value of $x + \frac{1}{x}$ over the domain $x > 0$?



3 **(a)** Sketch the graph of $f(x) = e^x + 4e^{-x}$. **(b)** For what values of x is $f'(x) > 0$?

(c) What is the minimum value of $f(x)$ and when does it occur?

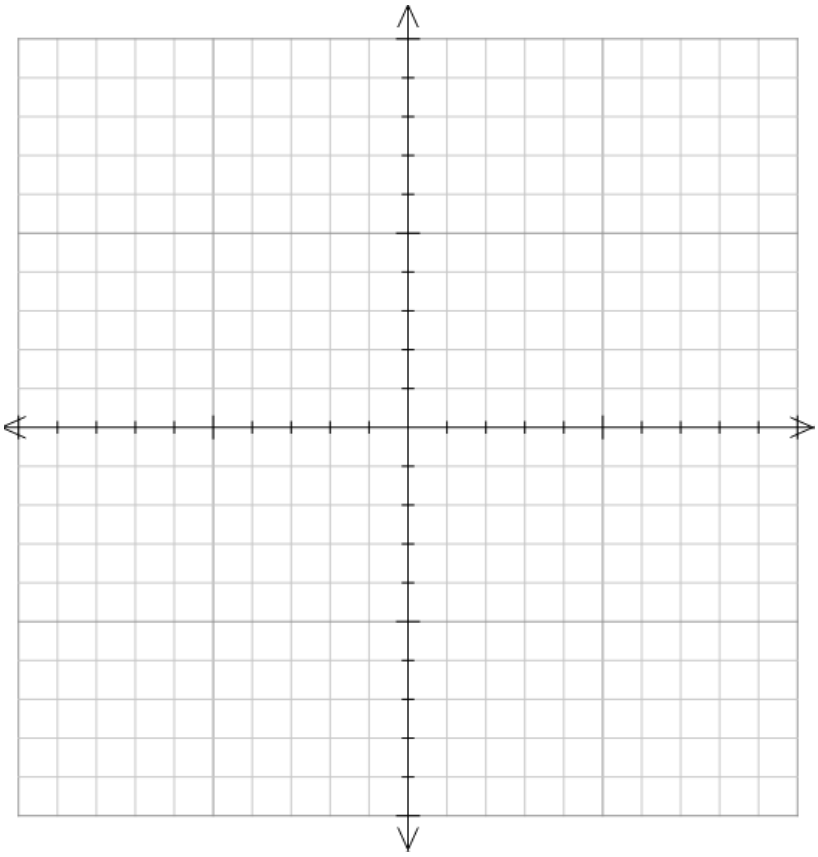


4 **(a)** Sketch the graph of $f(t) = \dfrac{5}{2+3e^{-t}}$, $t \geq 0$.

(b) Show that $f'(t) > 0$ for all values of t in the domain.

(c) Find $\lim\limits_{t\to\infty} f(t)$.

(d) What is the range of the function?



5 $f(x)$ is defined by the rule $f(x) = e^{-x}\cos x$ over the domain $-\frac{\pi}{2} \le x \le \frac{3\pi}{2}$.

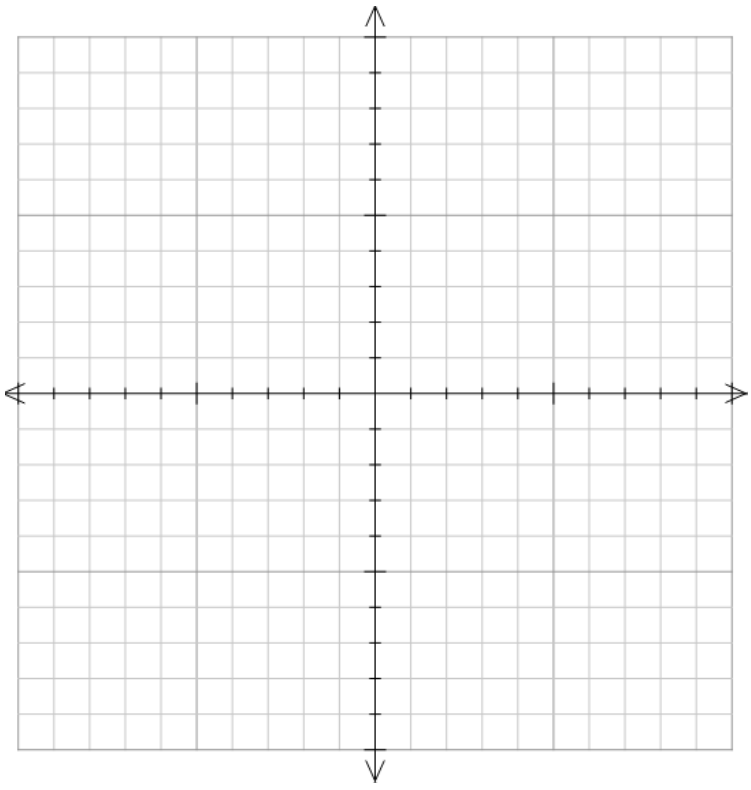
(a) Find the values of $f(0), f\left(\frac{\pi}{2}\right), f(\pi)$.

(b) Find $f'(x)$.

(c) Show that $f'(0) = -1, f'\left(\frac{3\pi}{4}\right) = 0$ and $f'\left(-\frac{\pi}{4}\right) = 0$.

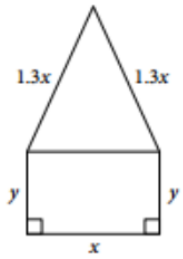
(d) Sketch the graph of $y = f(x)$.

(e) Find the maximum value of $f(x)$ over the domain and the value of x for which it occurs.



APPLICATIONS INVOLVING GRAPHING FUNTIONS

9 The diagram consists of a rectangle surmounted by an isosceles triangle with dimensions as shown.



(a) Show that the height of the isosceles triangle is $1.2\,x$.
(b) Show that the total area of the figure is given by $A = xy + 0.6x^2$.
(c) If the perimeter of the figure is 48 metres, express y in terms of x.
(d) Find the expression for $A(x)$ as a function of x only.
(e) Sketch the graph of $y = A(x)$.
(f) Find the dimensions of the diagram that give a maximum area and state that area.