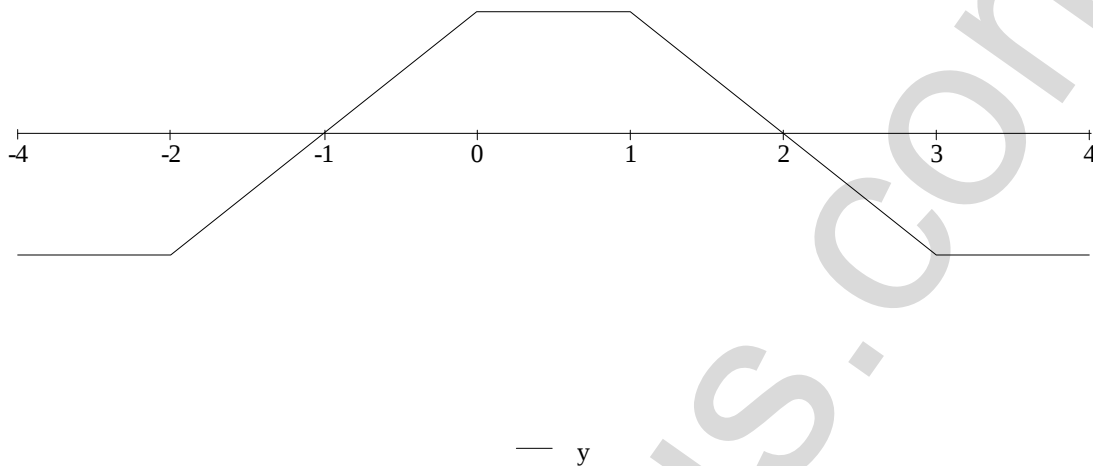


Mathematics Extension 2

1. (H.S.C. Q.4(a), '91)



The diagram is a sketch of the function $y = f(x)$.

On separate diagrams sketch:

(i) $y = -f(x)$

(ii) $y = |f(x)|$

(iii) $y = f(|x|)$

(iv) $y = \sin^{-1}(f(x))$

2. (H.S.C. Q.4(b), '92)

Let $f(x) = \ln(1+x) - \ln(1-x)$ where $-1 < x < 1$.

(i) Show that $f'(x) > 0$ for $-1 < x < 1$.

(ii) On the same diagram sketch

$$y = \ln(1+x) \text{ for } x > -1$$

$$y = \ln(1-x) \quad \text{for } x < 1$$

$$\text{and } y = f(x) \quad \text{for } -1 < x < 1.$$

Clearly label the three graphs.

(iii) Find an expression for the inverse function $y = f^{-1}(x)$.

3. (H.S.C. Q.4(a), '93)

Let $f(x) = \frac{1-x}{x}$. On separate diagrams sketch the graphs of the following functions. For each graph label any asymptote.

(i) $y = f(x)$

(ii) $y = f(|x|)$

(iii) $y = e^{f(x)}$

(iv) $y^2 = f(x)$

Discuss the behaviour of the curve of (iv) at $x = 1$.

4. (a) Given that $f(x) = x^2(x^2 - 1)(x - 1)$, sketch the following on separate axes. (It is not necessary to locate turning points).

(i) $y = f(x)$

(ii) $y = f(|x|)$

(iii) $y = |f(x)|$

(iv) $y^2 = f(x)$

(v) $y \cdot f(x) = 1$

(b) Sketch the curve $y = e^x(x-2)^2$, locating any intercepts, turning points, points of inflection and asymptotes.

Hence or otherwise, sketch $x^2e^{x+2} + y = 0$ on the same axes.