Year 11 Mathematics Extension 1

Topic: Further Functions (5 of 5)

Review Questions: Mixed One-Off Exam Questions

Term 3, 2026

How to use this set

These are real past-paper questions on further functions that do not fit any one recurring pattern: genuine one-offs. They are here so you also meet the rarer, less predictable exam questions. Work through them once you are solid on the patterns in the main review docs. Every question you get wrong or struggle with goes in your **Mistakes Log**.

Mixed one-off exam questions

Q1 2022 Killara Trial Q6 · **1 mark**

Find the Cartesian equation for the graph formed by the parametric equations

$$x = 4 + 4\cos t, \qquad y = 5 + 3\sin t.$$

(A) $\dfrac{(x+4)^2}{16} + \dfrac{(y+5)^2}{9} = 1$

(B) $\dfrac{(x-4)^2}{16} + \dfrac{(y-5)^2}{9} = 1$

(C) $(x-4)^2 + (y-5)^2 = 1$

(D) $\dfrac{(x-5)^2}{9} + \dfrac{(y-4)^2}{16} = 1$

Q2 2024 James Ruse Trial Q4 · **1 mark**

Let $f(x) = x^3$ where $x \in \{0, 1, 2, 3\}$. Which of the following is the domain of $f^{-1}(x)$?

(A) $\{0,\ 1,\ \sqrt{8},\ \sqrt{27}\}$

(B) $\left\{0,\ 1,\ \dfrac{1}{\sqrt[3]{8}},\ \dfrac{1}{\sqrt[3]{27}}\right\}$

(C) $\{0,\ 1,\ 8,\ 27\}$

(D) $\left\{0,\ 1,\ \dfrac{1}{8},\ \dfrac{1}{27}\right\}$

Q3 2025 Sydney Grammar Trial Q6 · **1 mark**

The function $f(x)$ has an inverse function, $f^{-1}(x)$. Which of the following is always a correct expression for the inverse of $y = f(3x)$?

(A) $f^{-1}\left(\dfrac{x}{3}\right)$

(B) $f^{-1}(3x)$

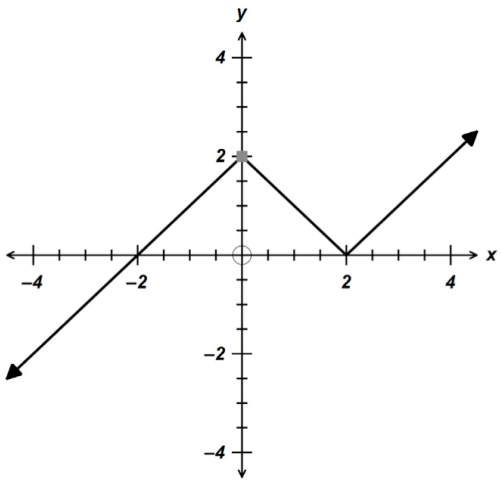
(C) $\dfrac{1}{3}f^{-1}(x)$

(D) $3f^{-1}(x)$

Q4 2022 Presbyterian Prelim Q12(d)(ii) · **3 marks**

The graph below shows $y = f(x)$, where

$$f(x) = \begin{cases} x + 2 & \text{for } x < 0, \\ |x - 2| & \text{for } x \geq 0. \end{cases}$$

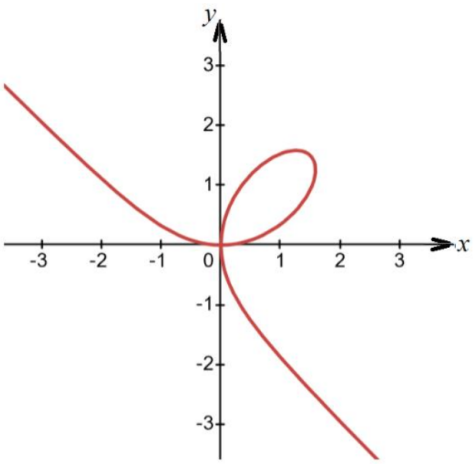


Sketch the graph of $y = f(x) + f(-x) + 1$, carefully showing any intercepts on the co-ordinate axes.

Q5 2024 Penrith Prelim Q13(a) · **3 marks**

The curve known as the "Folium of Descartes" is defined by the parametric equations

$$x = \frac{3t}{1+t^3}, \qquad y = \frac{3t^2}{1+t^3}.$$

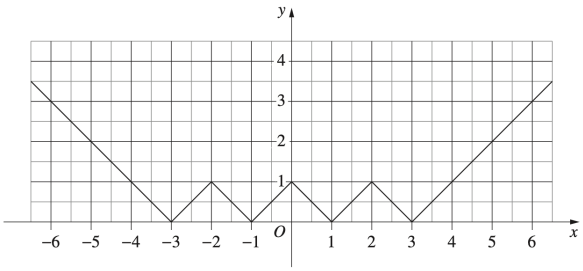


(i) Find $\frac{y}{x}$ in terms of t, expressing your answer in simplest form. (1 mark)

(ii) Deduce that the Cartesian equation of this curve is $x^3 + y^3 = 3xy$. (2 marks)

Q6 2023 HSC Q8 · **1 mark**

The diagram shows the graph of a function.



Which of the following is the equation of the function?

(A) $y = \left|1 - \left||x| - 2\right|\right|$

(B) $y = \left|2 - \left||x| - 1\right|\right|$

(C) $y = \left|1 - |x - 2|\right|$

(D) $y = \left|2 - |x - 1|\right|$

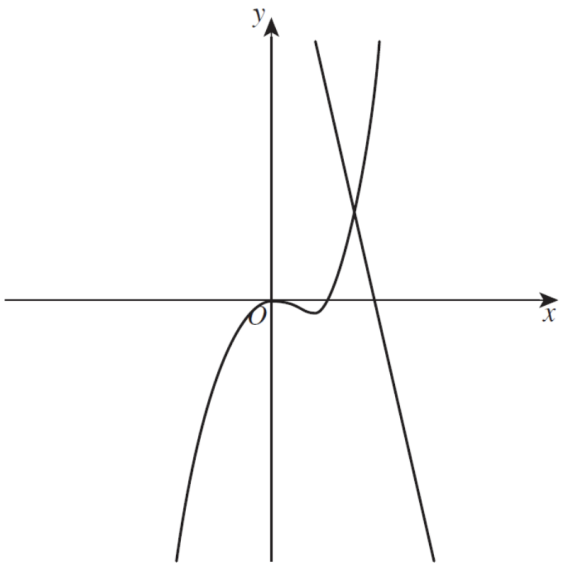
Q7 2023 Sydney Girls Trial Q13(c) · **3 marks**

(i) Expand $(2y - 1)^3$. (1 mark)

(ii) Hence, find the inverse function of $f(x) = 4x^3 - 6x^2 + 3x$. (2 marks)

Q8 2021 Frensham Trial Q12(c) · **4 marks**

The graphs of $g(x) = mx + b$ and $y = 3|x|^3 - 2|x|^2$ are shown below.



The solution to the inequality $mx + b < 3|x|^3 - 2|x|^2$ is $x < -2$ or $x > 1$.

(i) Sketch the graph of $y = 3|x|^3 - 2|x|^2$. (1 mark)

(ii) Hence, find the values of m and b. (3 marks)