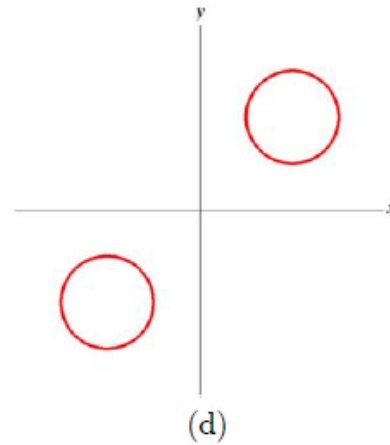
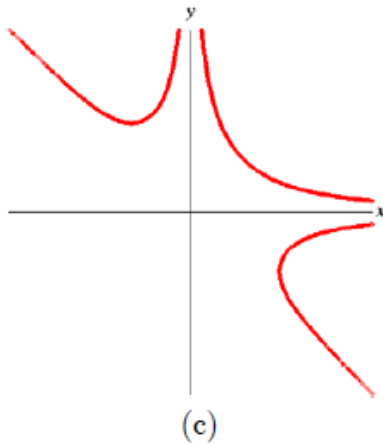
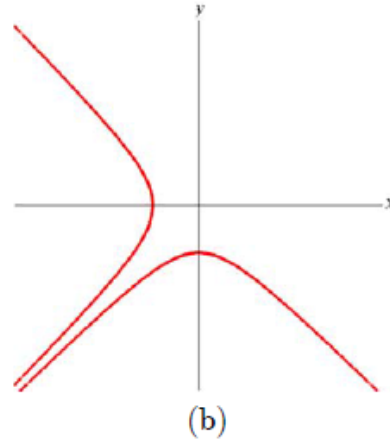
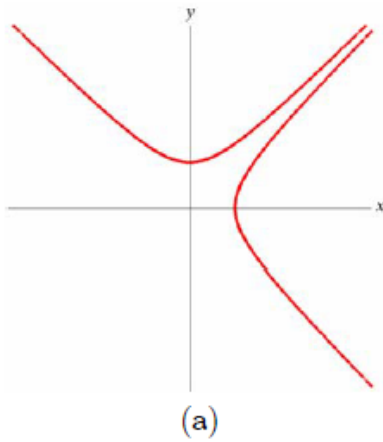


Core 2 Graphs Questions (From the Oxford MAT Tests)

For answers, see [the MAT website](#)

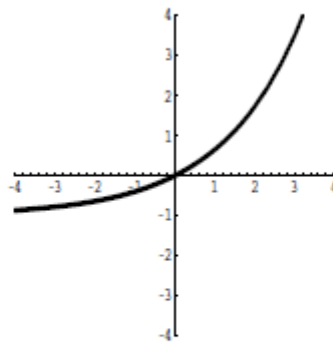
Specimen A, Question 1j:

J. A sketch of the curve with equation $x^2y^2(x + y) = 1$ is drawn in which of the following diagrams?

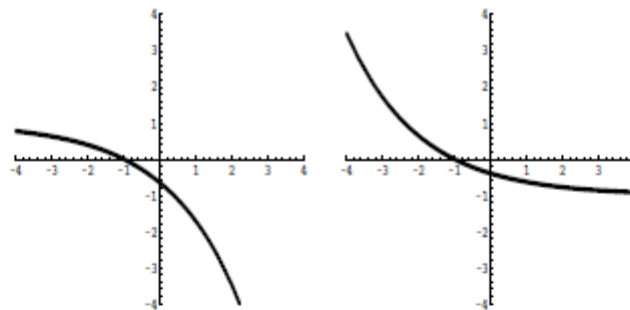


Specimen B, Question 1b:

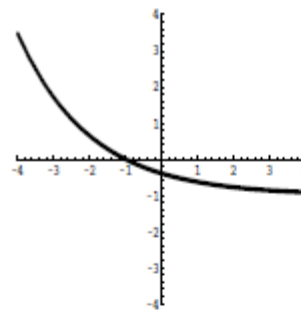
B. The diagram below shows the graph of the function $y = f(x)$.



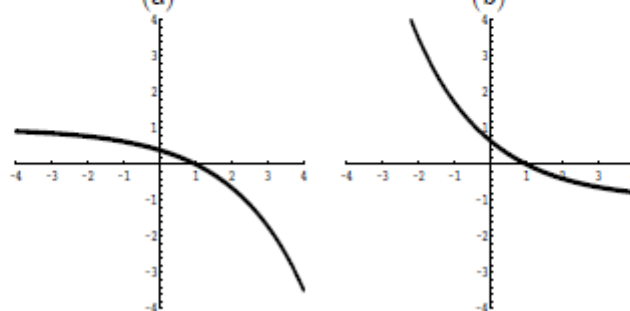
The graph of the function $y = -f(x + 1)$ is drawn in which of the following diagrams?



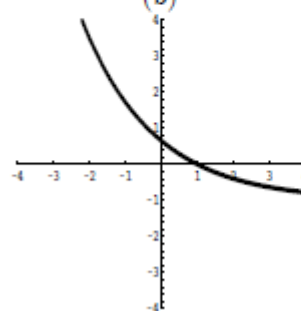
(a)



(b)



(c)



(d)

Specimen B, Question 3:

Let

$$f(x) = \begin{cases} x + 1 & \text{for } 0 \leq x \leq 1; \\ 2x^2 - 6x + 6 & \text{for } 1 \leq x \leq 2. \end{cases}$$

(i) On the axes provided below, sketch a graph of $y = f(x)$ for $0 \leq x \leq 2$, labelling any turning points and the values attained at $x = 0, 1, 2$.

(ii) For $1 \leq t \leq 2$, define

$$g(t) = \int_{t-1}^t f(x) \, dx.$$

Express $g(t)$ as a cubic in t .

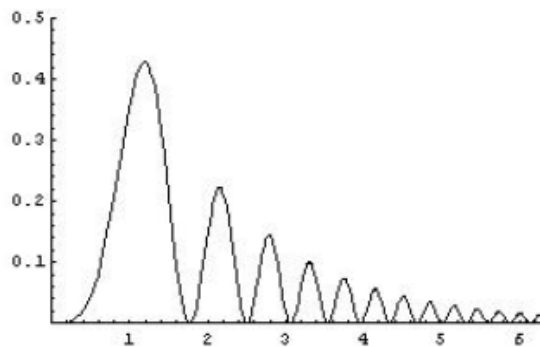
(iii) Calculate and factorize $g'(t)$.

(iv) What are the minimum and maximum values of $g(t)$ for t in the range $1 \leq t \leq 2$?

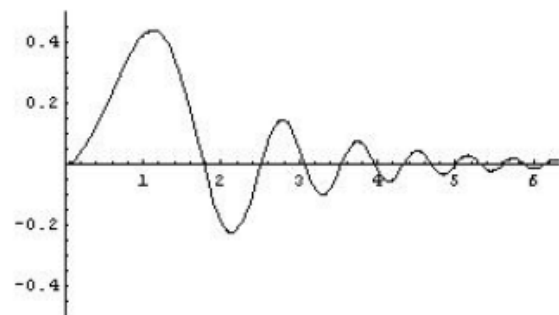
2007, Question 1g:

G. On which of the axes below is a sketch of the graph

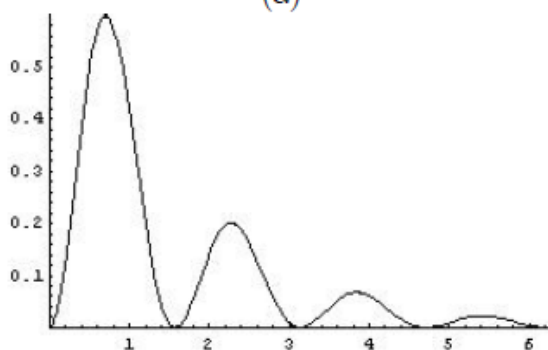
$$y = 2^{-x} \sin^2(x^2)?$$



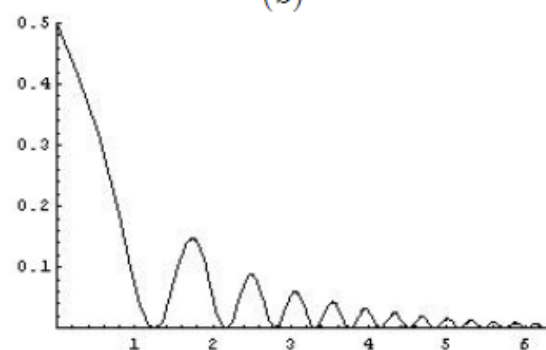
(a)



(b)



(c)

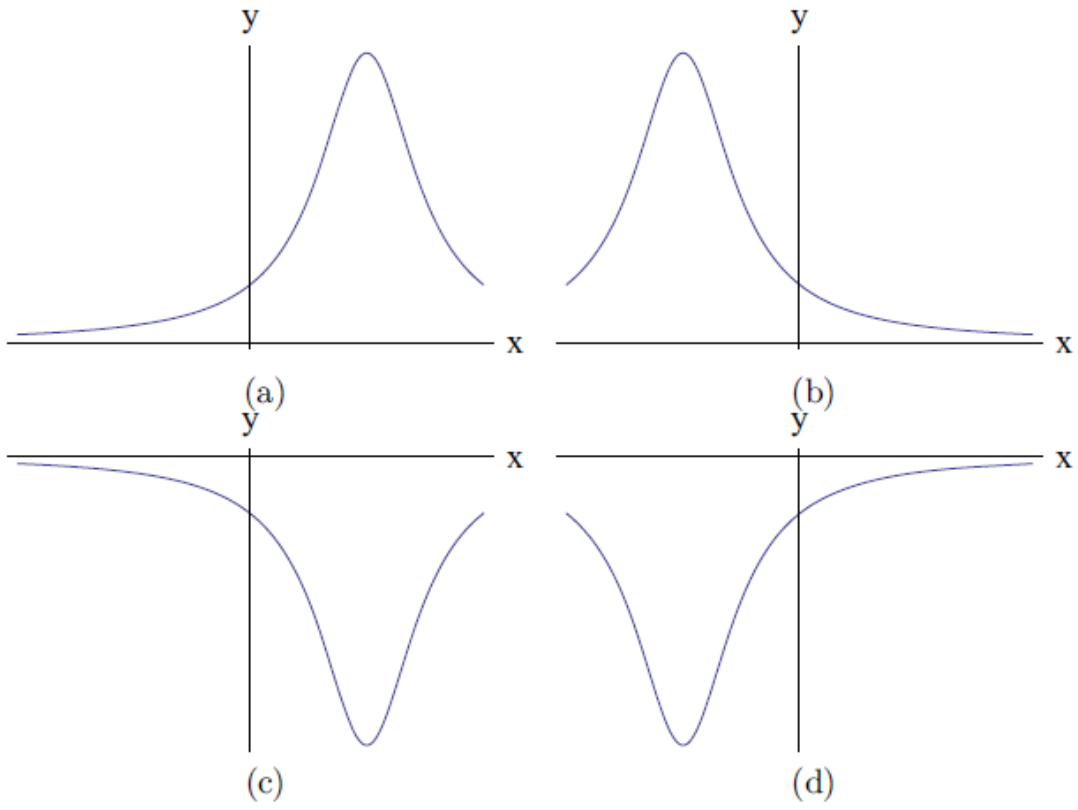


(d)

2008, Question 1g:

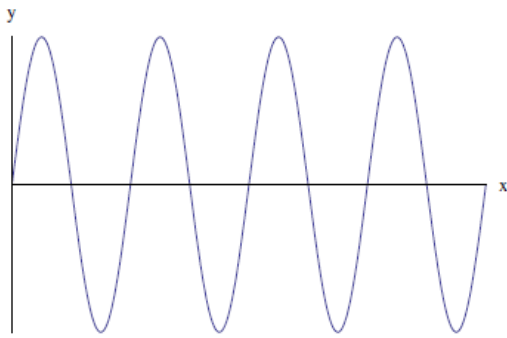
G. Which of the graphs below is a sketch of

$$y = \frac{1}{4x - x^2 - 5} \quad ?$$

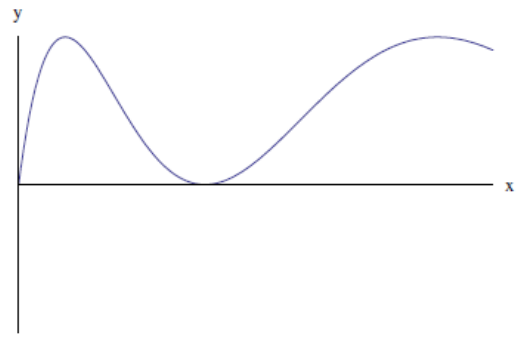


2010, Question 1d:

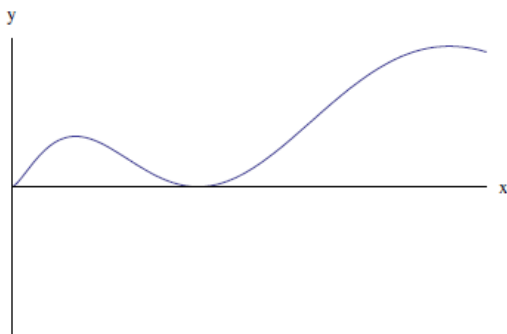
D. The graph of $y = \sin^2 \sqrt{x}$ is drawn in



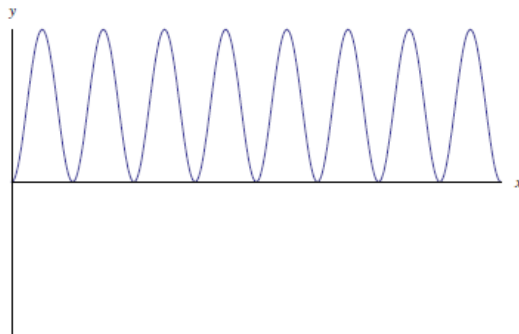
(a)



(b)



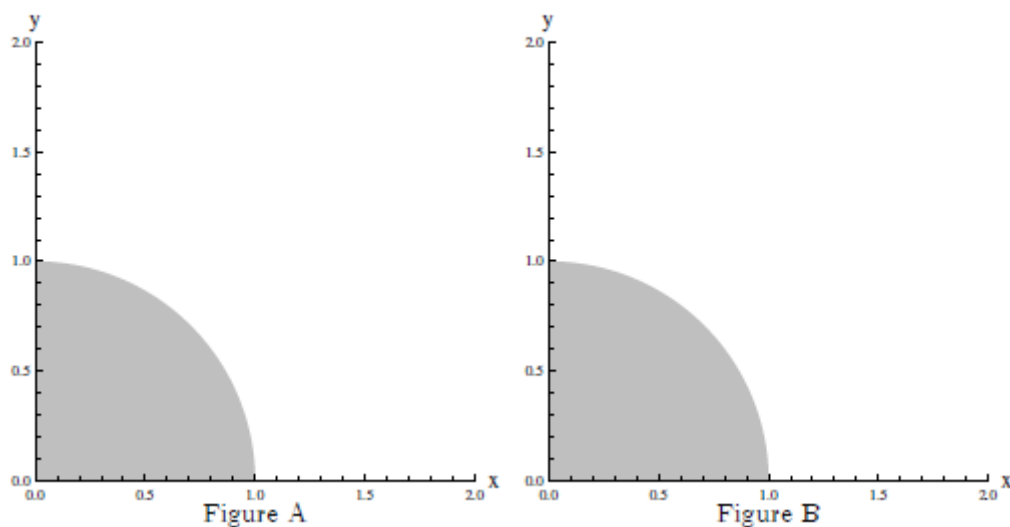
(c)



(d)

2011, Question 4:

Let Q denote the quarter-disc of points (x, y) such that $x \geq 0$, $y \geq 0$ and $x^2 + y^2 \leq 1$ as drawn in Figures A and B below.



(i) On the axes in Figure A, sketch the graphs of

$$x + y = \frac{1}{2}, \quad x + y = 1, \quad x + y = \frac{3}{2}.$$

What is the largest value of $x + y$ achieved at points (x, y) in Q ? Justify your answer.

(ii) On the axes in Figure B, sketch the graphs of

$$xy = \frac{1}{4}, \quad xy = 1, \quad xy = 2.$$

What is the largest value of $x^2 + y^2 + 4xy$ achieved at points (x, y) in Q ?

What is the largest value of $x^2 + y^2 - 6xy$ achieved at points (x, y) in Q ?

(iii) Describe the curve

$$x^2 + y^2 - 4x - 2y = k$$

where $k > -5$.

What is the *smallest* value of $x^2 + y^2 - 4x - 2y$ achieved at points (x, y) in Q ?

2014, Question 1i:

I. The graph of the function

$$y = 2^{x^2 - 4x + 3}$$

can be obtained from the graph of $y = 2^{x^2}$ by

- a stretch parallel to the y -axis followed by a translation parallel to the y -axis.
- a translation parallel to the x -axis followed by a stretch parallel to the y -axis.
- a translation parallel to the x -axis followed by a stretch parallel to the x -axis.
- a translation parallel to the x -axis followed by reflection in the y -axis.
- reflection in the y -axis followed by translation parallel to the y -axis.