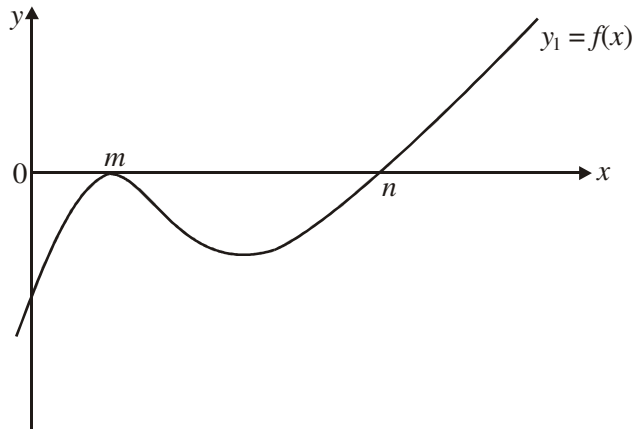


Note: The formula packet does not have any helpful hints for you. Hence, you need to really know what you are doing.

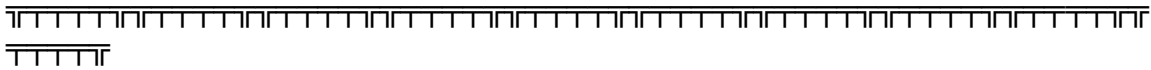
*Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.*

The only calculator question is #6.

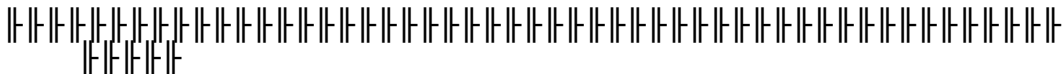
- The diagram below shows the graph of  $y_1 = f(x)$ . The  $x$ -axis is a tangent to  $f(x)$  at  $x = m$  and  $f(x)$  crosses the  $x$ -axis at  $x = n$ .



On the same diagram sketch the graph of  $y_2 = f(x - k)$ , where  $0 < k < n - m$  and indicate the coordinates of the points of intersection of  $y_2$  with the  $x$ -axis.



- The graph of the function  $f(x) = 2x^3 - 3x^2 + x + 1$  is translated to its image,  $g(x)$ , by the vector  $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$ . Write  $g(x)$  in the form  $g(x) = ax^3 + bx^2 + cx + d$ .

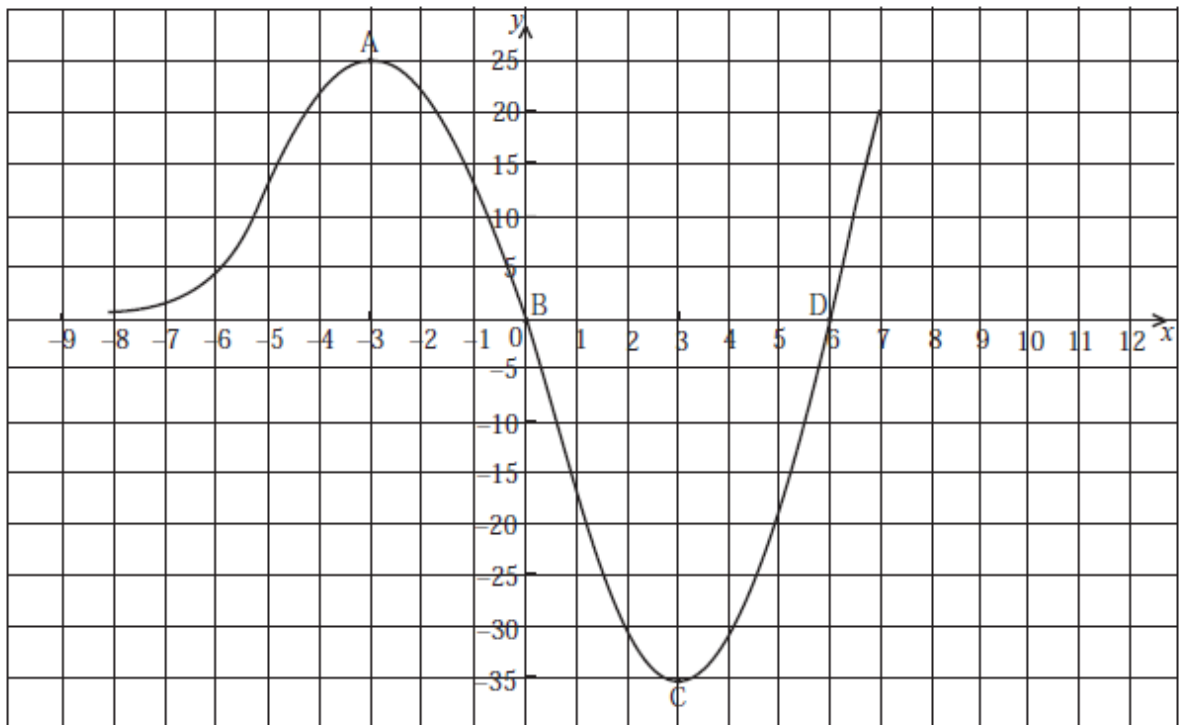


3.

The diagrams below show the graph of  $y = f(x)$  which passes through the points A, B, C and D.

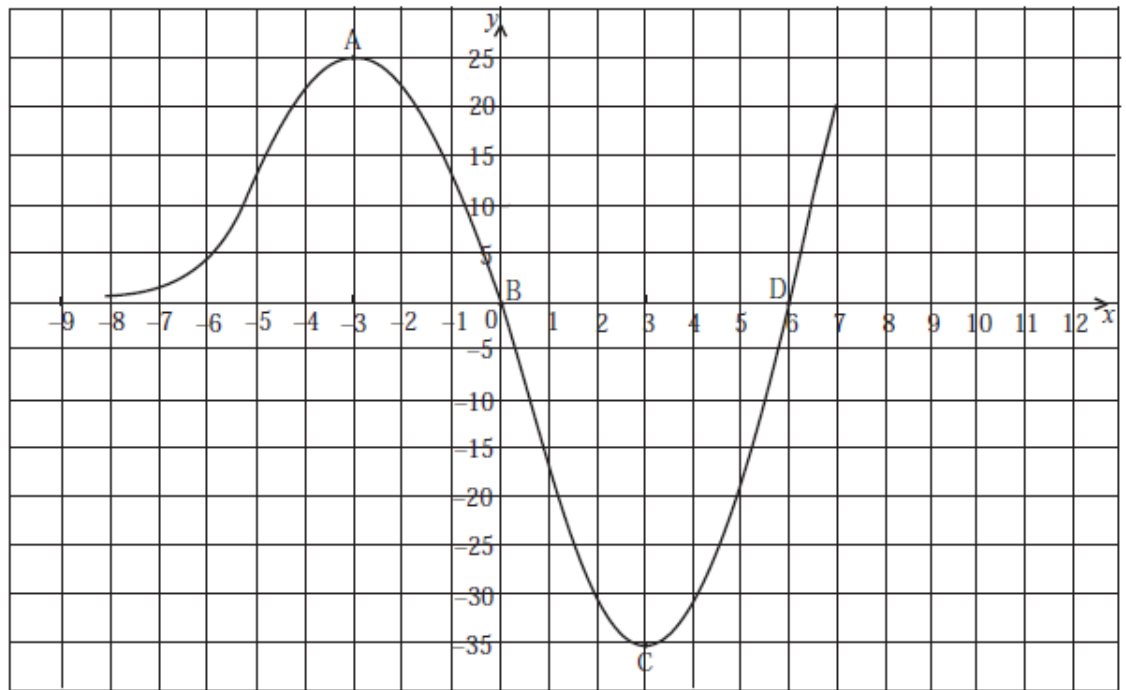
Sketch, indicating clearly the images of A, B, C and D, the graphs of

(a)  $y = f(x - 4)$ ;



(b)  $y = f(-3x)$ .

[4 n



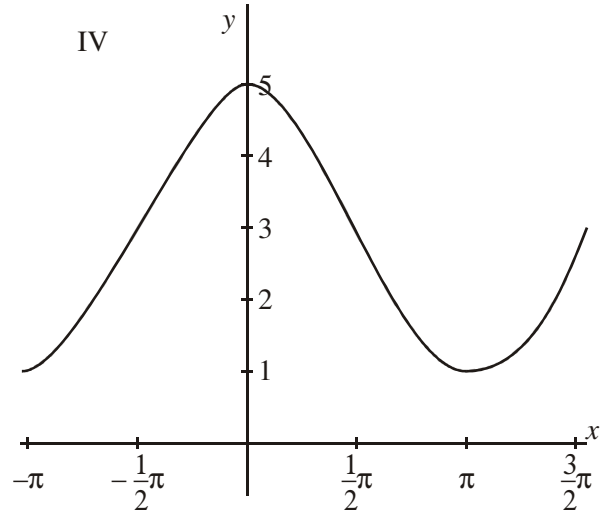
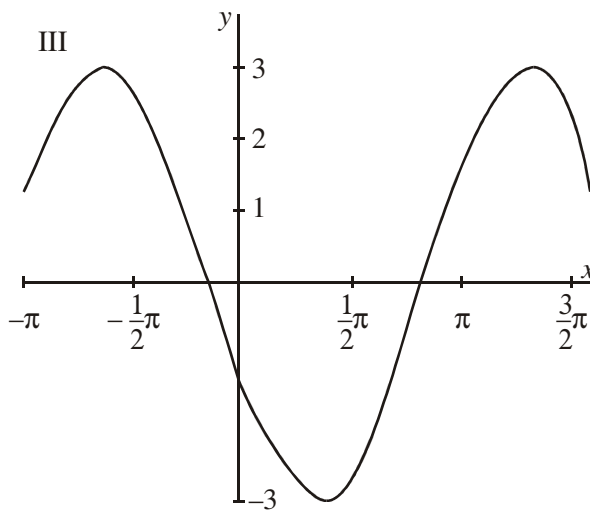
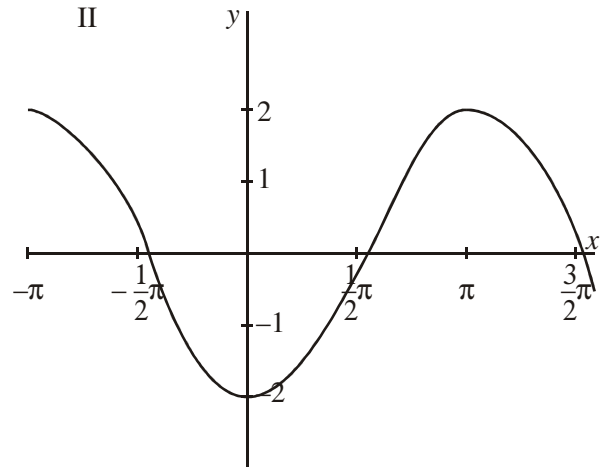
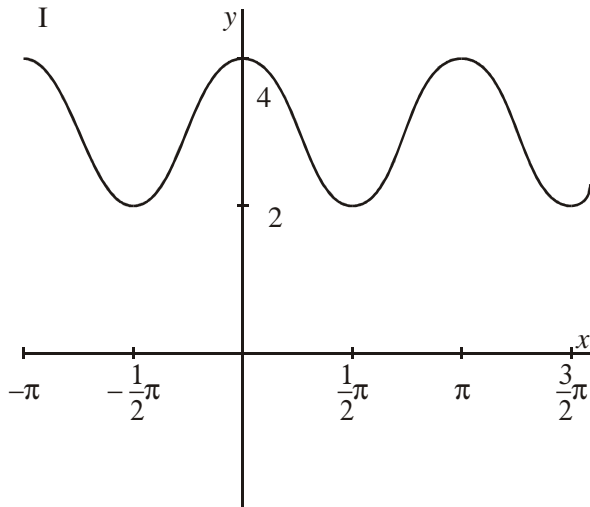
4. Three of the following diagrams I, II, III, IV represent the graphs of

(a)  $y = 3 + \cos 2x$

(b)  $y = 3 \cos(x + 2)$

(c)  $y = 2 \cos x + 3$ .

Identify which diagram represents which graph



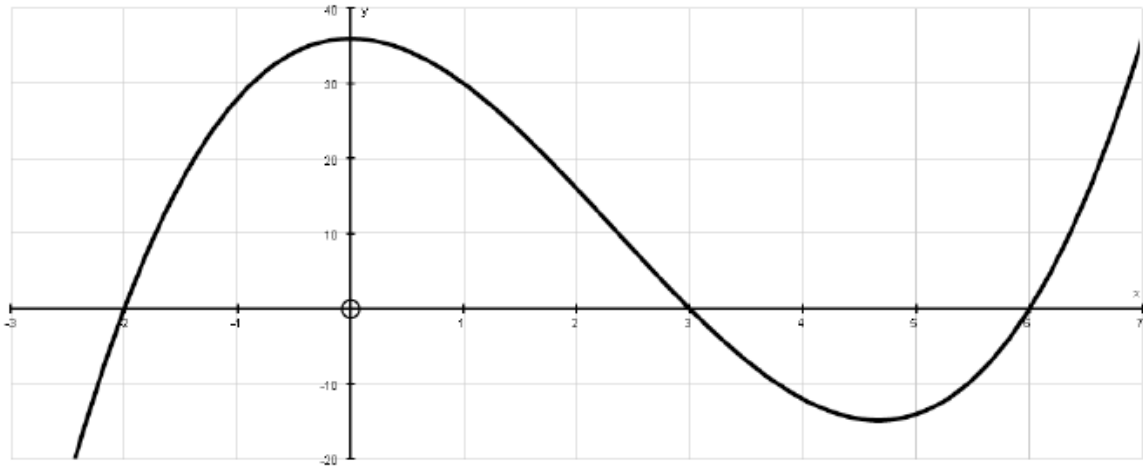
5.

This is a non-calculator problem so no peeking!

- (a) Sketch the curve  $f(x) = \sin 2x$ ,  $0 \leq x \leq \pi$ .
- (b) Hence sketch on a separate diagram the graph of  $g(x) = \csc 2x$ ,  $0 \leq x \leq \pi$ , clearly stating the coordinates of any local maximum or minimum points and the equations of any asymptotes.

6. This is a calculator problem so use your calculator.

The graph of  $y = f(x)$  for  $-3 \leq x \leq 7$  is shown.



Copy the set of axis below and graph  $y = \frac{1}{f(x)}$ , clearly showing any asymptotes and indicating any local maxima or minima coordinates.

