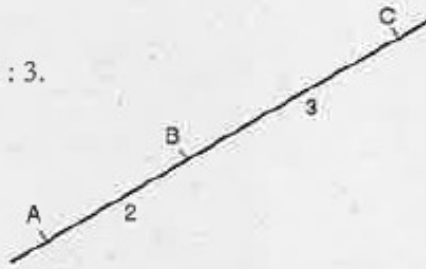
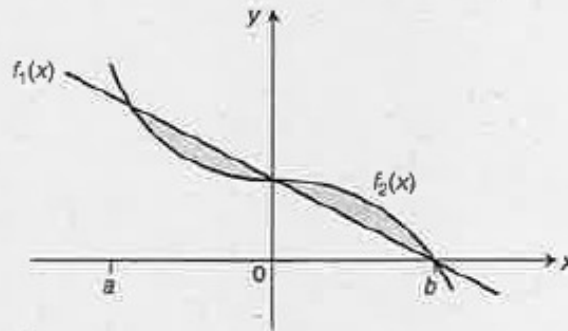


## TEST PAPER E

1.  $A = (4, -1, 5)$ ,  $C = (-1, 4, 10)$   
 B is a point which divides AC in the ratio 2 : 3.  
 Find the coordinates of B.



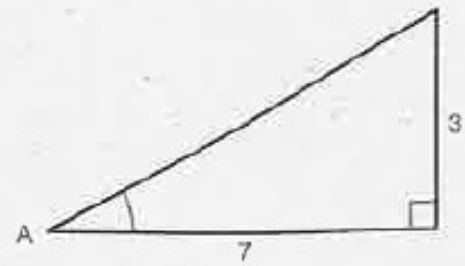
2. Write down an expression for the total shaded area as the sum of two integrals.



3. In how many places does the graph of  $f: x \rightarrow \sin 3x$  cross the  $x$ -axis,  $0 \leq x < 360$ ?  
 Draw a rough sketch to illustrate your answer.
4. A circle has equation  $x^2 + y^2 - 8x + 6y + 21 = 0$ . Find the equation of the circle under reflection in the  $y$ -axis.
5. (a) Using the method of completing the square, find the minimum value of  $y = 1 + 2x - x^2$ .  
 (b) Make a rough sketch of the curve, showing the turning point and any axis intercepts.  
 (c) From your sketch, state the nature of the roots of the equation, giving an explanation.
6. Find  $f^{-1}\left(\frac{\pi}{4}\right)$  if  $f(x) = 2 \sin 3x$ .
7. A triangle has coordinates  $P(1, 2)$ ,  $Q(6, 3)$  and  $R(5, -2)$  respectively.  
 (a) Find C the coordinates of the centroid of the triangle.  
 (b) Find the mid-points M of PR and N of QP and the ratios  $QC : QM$  and  $RC : CN$ .

8. Factorise  $x^3 - 3x^2 - 4x + 12$ .

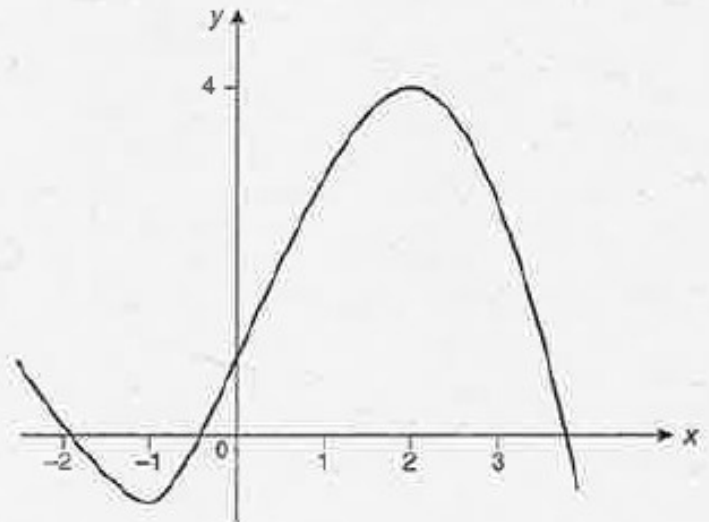
9. In a right-angled triangle,  $\tan A = \frac{3}{7}$ . Find the exact value of  $\cos 2A$ .



10. When  $f(x) = (2x^2 - x)^5$ , find  $f'(x)$ .

11.  $f(x)$  is shown in the diagram.

Make a rough sketch of  $f'(x)$ .



12.  $C = 3 \cos \left( x + \frac{\pi}{3} \right)$       $0 \leq x \leq 2\pi$ .

Find the maximum and minimum values of  $C$  and the corresponding values of  $x$ .