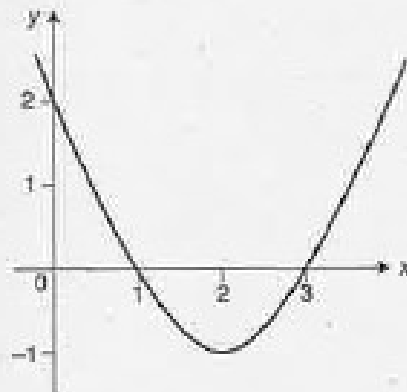


TEST PAPER D

1. In a right angled triangle $\tan A = \frac{3}{2}$, show that $\cos A$ can be expressed in the form $p\sqrt{13}$ and state the exact value of p .



2. When $f(x) = \sin^3 x + \cos^2 x$, find $f'(x)$ and $f'\left(\frac{\pi}{4}\right)$. (Leave your answer in surd form.)
3. The graph shown is $f(x)$. Sketch $-f(x)$ and $f(x) + 1$ on separate graphs.



4. (a) In how many places does the graph of $f: x \rightarrow \sin 4x$ cross the x -axis, $0 \leq x \leq 360$?
 (b) Sketch the graph to illustrate your answer.
5. (a) Find the equation of the line through $(0, -1)$ which makes an angle of 45° with the x -axis.
 (b) State the equation of the line which is perpendicular to this line and passes through the point $(1, 3)$.
 (c) State the y -intercept of this perpendicular line and the angle which it makes with the x -axis.
6. (a) $A = 3 \cos\left(x - \frac{\pi}{6}\right)$ $0 \leq x \leq 2\pi$
 Find the maximum and minimum values of A .
 (b) State the coordinates of the turning points.

7. A triangle has coordinates $(1, 2)$, $(-3, 4)$ and $(5, 6)$ respectively.
Find the coordinates of the centroid of the triangle.
8. P is the point $(2, -1, 3)$ relative to rectangular axes OX, OY and OZ. Find the cosine of angle POX.
(Leave your answer as a surd.)
9. (a) If $u_{r+1} = mu_r + c$, find m and c and state the relationship in the form $u_{r+1} = mu_r + c$ when $u_0 = -1$, $u_1 = 7$ and $u_2 = -9$.
- (b) Find u_3 and u_{-1} .
- (c) Find a value for u_r such that $u_{r+1} = u_r$.
10. If $g(x) = 3 - x^2$ and $f(x) = 1 - 2x$, find $g(f(x))$.
11. (a) Show that the function $3x^2 - 2x + 5$ has no real roots.
- (b) Show by completing the square that the function $3x^2 - 2x + 5$ has minimum value $\frac{14}{3}$.
- (c) Make a rough sketch of the function.
12. (a) Find the equation of the tangent to the curve $y = x^3 + 2x^2 - 4$ at the point where $x = -1$.
- (b) Find the size of the angle between the tangent and the positive direction of the x -axis.