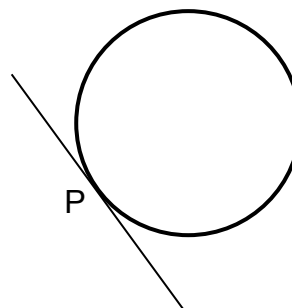


Higher Mathematics – Homework A

Non-calculator section:

1. Find the equation of the perpendicular bisector of the line joining the points A(-3,1) and B(5,-3)

2. Find the equation of the tangent to the circle $x^2 + y^2 - 8x + 4y - 33 = 0$ at the point P(1,-4).

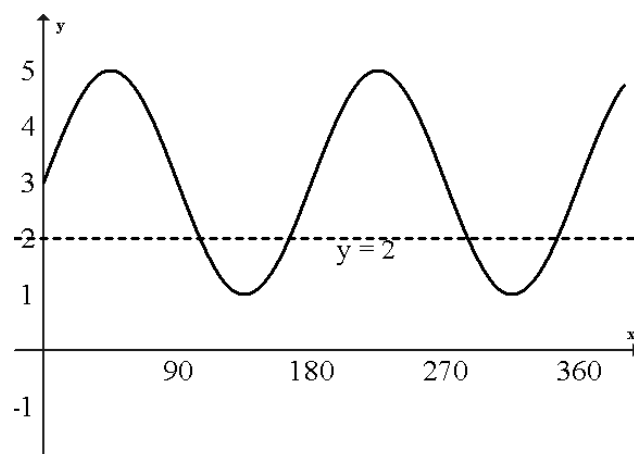


3. A recurrence relation is defined as $u_{n+1} = 0.8u_n + 10$, $u_1 = 26$

- (a) Find the value of u_0 and u_2 .
- (b) State why this relation has a limit and calculate this limit.

4. The diagram opposite shows the graph $y = a \sin bx + c$.

- (a) Write down the values of a, b and c.
- (b) Find the points of intersection between this curve and the line $y = 2$ for $0 \leq x \leq 360$



5. $f(x) = \frac{x^3 - 3x}{\sqrt{x}}$ find $f'(4)$

6. (a) Express $4 - 6x - x^2$ in the form $(x + a)^2 + b$.
(b) Hence sketch the graph of $f(x) = 4 - 6x - x^2$ showing clearly its turning point and where it cuts the y-axis.
(c) On the same diagram sketch the graph of $y = 6 - f(x)$.

7. (a) Given that $(x - 2)$ and $(x + 2)$ are both factors of $f(x) = x^3 + x^2 + px + q$, find the values of p and q.
(c) Solve $f(x) = 0$ for these values.

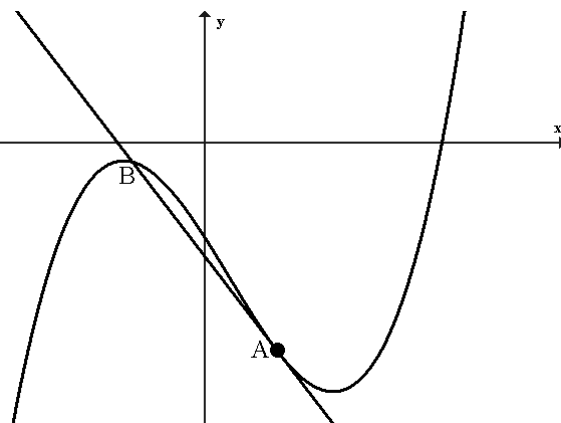
Calculator section:

8. Show that the roots of $(t - 1)x^2 + 2tx + 4 = 0$ are real for all values of t .

9. Given $\tan x = \frac{5}{12}$, find the exact value of $\cos 2x$.

10. The diagram shows the graph of $y = x^3 - x^2 - 6x - 5$ and a tangent to this curve at the point $A(1, -11)$.

- (a) Find the equation of this tangent.
- (b) Find the coordinates of B , the point where the tangent meets the curve again.



11. $f'(x) = x^2 - 4x = 6$ and $f(3) = 4$. Find a formula for $f(x)$.

12. Solve the equation $2\cos 2x - 3\cos x + 1 = 0$ for $0 \leq x \leq 360$