Name:

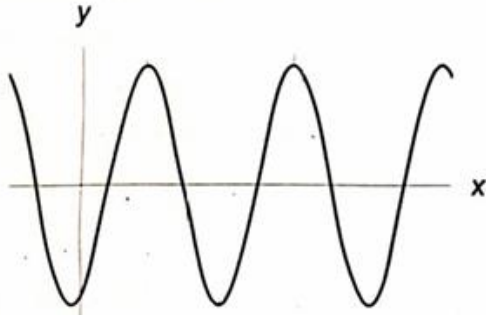## MATHEMATICS   Series B

The answers must be justified.

Problem 1   3.0 points

Consider the function f defined by $f(x) = 5\sin(\pi x) - 12\cos(\pi x)$.
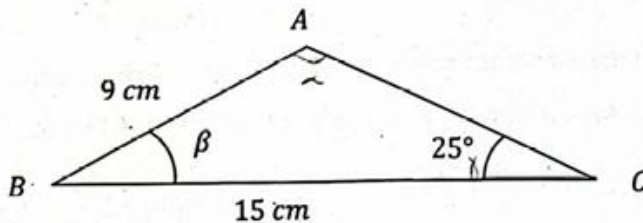
The graph of f is given below.

a)   The function has infinitely many minimums. Give the coordinates of one of them.

b)   Consider the equation $f(x) = 6.5$. Calculate its solutions between 3 and 5.

Problem 2   2.0 points

Consider the following triangle. The drawing is not to scale.

The angle β is acute ($< 90°$).

Calculate the length of the side AC and the angle β.

Problem 3   3.0 points

Consider the points $A(-9; -6)$, $B(b_1; 4)$ and a point P on the segment AB.

The distance from A to P is 16 units and the distance from R to B is 4 units.

Calculate b_1 and the coordinates of P.

Problem 4   2.0 points

Line d passes through the point $A(2; -7)$ and is parallel to the vector $\vec{d} = \begin{pmatrix} -4 \\ 5 \end{pmatrix}$.

a)   Calculate a such that the point $P(a; 33)$ is on line d.

b)   Calculate the acute angle between line d and line e: $\begin{cases} x = 2 + \lambda \\ y = 3 \end{cases}$.