13Ma Pure Mini Test Modulus Function, Geometric Series, Radians

Question 1





Figure 1 shows a sketch of part of the graph y = f(x), where

$$f(x) = 2|3 - x| + 5, \quad x \ge 0$$

(a) State the range of f(x)

(b) Solve
$$f(x) = \frac{1}{2}x + 30$$
 [3]

Given that the equation f(x) = k, where k is a constant, has two distinct roots,

(c) State the set of possible values for k.

[2]

[1]

Question 2

The 4^{th} term of a geometric series is 125 and the 7^{th} term is 8.

- (a) Find the common ratio for the series. [2]
- (b) Find, to 3 decimal places, the differences between the sum to infinity and the sum of the first 10 terms of this series.
 [4]

Question 3



Figure 2

Figure 2 shows a sketch two curves with equations for $0 < x \le 2\pi$:

- $y = \tan x$
- $y = 5\cos x$

The curves meet at the points A and B, as shown in Figure 2.

(a) Show that the x coordinates of points A and B satisfy the equation

$$k\sin^2 x + \sin x - k = 0$$

where k is a constant to be found.

[4]

[4]

(b) Hence find, to 2 decimal places, the coordinates of A and B.