**Trigonometry 3**

**1.** Express in the form , where and .

 Hence,

 (i) find the maximum value of and the corresponding angle, at which the maximum value occurs.

 (ii) Solve for .

 , where and

 (i)

 Since ,

 Therefore, the maximum of is 4.

 Maximum occurs when

 When , , where .

 When , , where .

 (ii)

 Since , .

**2.** Prove **(i)** **(ii)**

 If , then the principal values of .

 **(i)** **Method 1**

 **Method 2**

 Let

 Integrate, , a constant.

 Put

 Hence,

 **Method 3**

 **(ii)**

**3.** Prove :

**4.** Solve the equation by expressing in the form ,

 where

 Squaring,

 Put ,

 We get

 , where n is an integer.

 Since

 Or

 Note that squaring an equation may create roots, since

 Therefore is rejected.

**5.** Prove that :

Let be the proposition: .

We like to use the Principle of Mathematical Induction to prove that is true .

For . is true.

Assume is true for some , that is,

For , , by (\*)

 is true.

 By the Principle of Mathematical Induction, is true .

**6.** **(i)** Find the set of values of x in the interval such that .

 **(ii)** From **(i)**, find the set of values of x in the interval such that

 **(i)**

 For ,

 , where .

 Hence for ,

 For ,

 , where .

 Hence for ,

 For , the solution is the union of (1) and (2),

 **(ii)**

**7.** Referring to the diagram, building A is measured with 50 m in height. The angle from the base of the building A to the highest point of building B is measured as . The angle formed from the rooftop of building A right to the highest point of building B is . What is the distance that keeps the two buildings apart?

 **Method 1**

 Let . .

C

D

E

 **Method 2**

By Sine Law,

**Method 3**

 Apply Cosine Law to ,

**8.** It is given that .

 **(a)** Express in the form of , where a, b and c are constants.

 **(b)** Show that can be expressed in the form of , where r and c are constants and .

 **(c)** Find the maximum and minimum values of the express .

 **(d)** Find the values of x between and such that .

 **(e)** Find the set of values of x in the interval such that .

 **(a)**

 .

**(b)**

 , where .

 .

**(c)**

 . Max of and min. of .

 **(d)**

 When

 or

 **(e)**

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