Algebra assignment

July 31, 2023

Questions

1. If α and β are the zeroes of the quadratic polynomial $p(x) = x^2 - ax - b$, then the value of $\alpha^2 + \beta^2$ is:

   (a) $a^2 - 2b$

   (b) $a^2 + 2b$

   (c) $b^2 - 2a$

   (d) $b^2 + 2a$

2. The below is the Assertion and Reason based question. Two statements are given, one labelled as Assertion(A) and the other is labelled as Reason(R). Select the correct answer to these questions from the codes (a),(b),(c) and (d) as given below.

   (a) Both Assertion(A) and Reason(R) are true and Reason(R) is the correct explanation of the Assertion(A).

   (b) Both Assertion(A) and Reason(R) are true, but Reason(R) is not the correct explanation of the Assertion(A).

   (c) Assertion(A) is true, but Reason(R) is false.

   (d) Assertion(A) is false, but Reason(R) is true.
   Assertion(A): The polynomial $p(x) = x^2 + 3x + 3$ has two real zeroes.
   Reason(R): A quadratic polynomial can have at most two real zeroes.

3. (a) If

$$4\cot^2 45^\circ - \sec^2 60^\circ + \sin^2 60^\circ + p = \frac{3}{4}, \tag{1}$$

then find the value of p.

(b) If

$$\cos A + \cos^2 A = 1, \tag{2}$$

then find the value of

$$\sin^2 A + \sin^4 A. \tag{3}$$

4. Prove that:

$$\left(\frac{1}{\cos\theta} - \cos\theta\right)\left(\frac{1}{\sin\theta} - \sin\theta\right) = \frac{1}{\tan\theta + \cot\theta} \tag{4}$$

5. The value of k for which the pair of equations $kx = y+2$ and $6x = 2y+3$ has infinitely many solutions,

   (a) is $k = 3$
   (b) does not exist
   (c) is $k = -3$
   (d) is $k = 4$

6. If $2\tan A = 3$, then the value of $\frac{4sinA+3\cos A}{4\sin A-3\cos A}$ is

   (a) $\frac{7}{\sqrt{13}}$
   (b) $\frac{1}{\sqrt{13}}$
   (c) 3
   (d) does not exist

7. If α, β are the zeroes of a polynomial $p(x) = x^2 + x - 1$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ equals to

   (a) 1
   (b) 2
   (c) -1
   (d) $\frac{-1}{2}$