Algebra – 2021 A2

1. June/2021/Paper_9709/21/No.1

Solve the inequality $|3x - 7| < |4x + 5|$. [4]

2. June/2021/Paper_9709/21/No.7

The polynomial $p(x)$ is defined by

$$p(x) = ax^3 - 11x^2 - 19x - a,$$

where a is a constant. It is given that $(x - 3)$ is a factor of $p(x)$.

(a) Find the value of a. [2]

(b) When a has this value, factorise $p(x)$ completely. [3]

(c) Hence find the exact values of y that satisfy the equation $p(e^y + e^{-y}) = 0$. [4]

3. June/2021/Paper_9709/22/No.2

The solutions of the equation $5|x| = 5 - 2x$ are $x = a$ and $x = b$, where $a < b$.

Find the value of $|3a - 1| + |7b - 1|$. [5]

4. June/2021/Paper_9709/22/No.5

(a) Find the quotient when $x^4 - 32x + 55$ is divided by $(x - 2)^2$ and show that the remainder is 7. [3]

(b) Factorise $x^4 - 32x + 48$. [2]

(c) Hence solve the equation $e^{-12y} - 32e^{-3y} + 48 = 0$, giving your answer in an exact form. [2]

5. March/2021/Paper_9709/22/No.1

(a) Sketch, on the same diagram, the graphs of $y = |3x - 5|$ and $y = x + 2$. [2]

(b) Solve the equation $|3x - 5| = x + 2$. [3]

6. March/2021/Paper_9709/22/No.1

(a) Sketch, on the same diagram, the graphs of $y = |3x - 5|$ and $y = x + 2$. [2]

(b) Solve the equation $|3x - 5| = x + 2$. [3]

7. March/2021/Paper_9709/22/No.6

The polynomial $p(x)$ is defined by

$$p(x) = x^3 + ax + b,$$

where a and b are constants. It is given that $(x + 2)$ is a factor of $p(x)$ and that the remainder is 5 when $p(x)$ is divided by $(x - 3)$.

(a) Find the values of a and b. [5]

(b) Hence find the exact root of the equation $p(e^{2y}) = 0$. [5]