1. Nov/2021/Paper_9709/21/No.2

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

(b) Find the coordinates of the point where the two graphs intersect. [3]

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(c) Deduce the solution of the inequality $3x < |x - 3|$. [1]

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2. Nov/2021/Paper_9709/21/No.6

The polynomials $f(x)$ and $g(x)$ are defined by

$$f(x) = 4x^3 + ax^2 + 8x + 15 \qquad \text{and} \qquad g(x) = x^2 + bx + 18,$$

where a and b are constants.

(a) Given that $(x + 3)$ is a factor of $f(x)$, find the value of a. [2]

(b) Given that the remainder is 40 when $g(x)$ is divided by $(x - 2)$, find the value of b. [2]

(c) When a and b have these values, factorise $f(x) - g(x)$ completely. [3]

(d) Hence solve the equation $f(\text{cosec}\,\theta) - g(\text{cosec}\,\theta) = 0$ for $0 < \theta < 2\pi$. [3]

3. Nov/2021/Paper_9709/22/No.1

The polynomial $p(x)$ is defined by

$$p(x) = ax^3 + bx - 10,$$

where a and b are constants. It is given that $(x + 2)$ is a factor of $p(x)$ and that the remainder is -55 when $p(x)$ is divided by $(x + 3)$.

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

(b) Hence factorise $p(x)$ completely. [3]

(a) Sketch, on the same diagram, the graphs of $y = x + 3$ and $y = |2x - 1|$. [2]

(b) Solve the equation $x + 3 = |2x - 1|$. [3]

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(c) Find the value of y such that $5^{\frac{1}{2}y} + 3 = \left|2 \times 5^{\frac{1}{2}y} - 1\right|$. Give your answer correct to 3 significant figures. [2]

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