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Algebra – Modulus & Inequalities P3

Q1

Solve the inequality $2x > |x - 1|$. [4]

Q2

Find the set of values of x satisfying the inequality $|3^x - 8| < 0.5$, giving 3 significant figures in your answer. [4]

Q3

Solve the inequality $|x - 2| > 3|2x + 1|$. [4]

Q4

Solve the inequality $2 - 3x < |x - 3|$. [4]

Q5

Solve the inequality $|x + 3a| > 2|x - 2a|$, where a is a positive constant. [4]

Q6

Solve the inequality $|x - 3| > 2|x + 1|$. [4]

Q7

Solve the inequality $2|x - 3| > |3x + 1|$. [4]

Q8

Solve the inequality $|x| < |5 + 2x|$. [3]

Q9

Solve the equation $|4 - 2^x| = 10$, giving your answer correct to 3 significant figures. [3]

Q10

Find the set of values of x satisfying the inequality $3|x - 1| < |2x + 1|$. [4]

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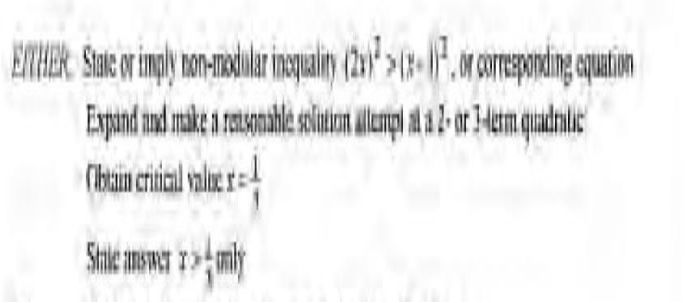
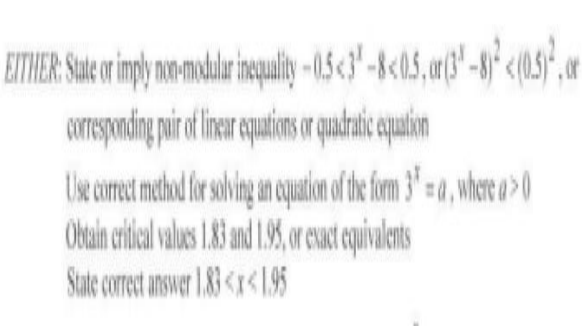
Answers:

Q1:



Q2:



Q3:

EITHER State or imply non-modular inequality $(x-2)^2 > (3(2x+1))^2$, or corresponding quadratic equation, or pair of linear equations $(x-2) = \pm 3(2x+1)$

Make reasonable solution attempt at a 3-term quadratic, or solve two linear equations

Obtain critical values $x = -1$ and $x = -\frac{1}{7}$

State answer $-1 < x < -\frac{1}{7}$

Q4:

EITHER: State or imply non-modular inequality $(2-3x)^2 < (x-3)^2$, or corresponding equation, and make a reasonable solution attempt at a 3-term quadratic M1

Obtain critical value $x = -\frac{1}{2}$ A1

Obtain $x > -\frac{1}{2}$ A1

Fully justify $x > -\frac{1}{2}$ as only answer A1

Q5:

EITHER: State or imply non-modular inequality $(x+3a)^2 > (2(x-2a))^2$, or corresponding quadratic equation, or pair of linear equations $(x+3a) = \pm 2(x-2a)$

Make reasonable solution attempt at a 3-term quadratic, or solve two linear equations

Obtain critical values $x = \frac{1}{3}a$ and $x = 7a$

State answer $\frac{1}{3}a < x < 7a$

Q6:

EITHER: State or imply non-modular inequality $(x-3)^2 > (2(x+1))^2$, or corresponding quadratic equation, or pair of linear equations $(x-3) = \pm 2(x+1)$

Make reasonable solution attempt at a 3-term quadratic, or solve two linear equations

Obtain critical values -5 and $\frac{1}{3}$

State answer $-5 < x < \frac{1}{3}$

Q7:

EITHER: State or imply non-modular inequality $(2(x-3))^2 > (3x+1)^2$, or corresponding quadratic equation, or pair of linear equations $2(x-3) = \pm(3x+1)$

Make reasonable solution attempt at a 3-term quadratic, or solve two linear equations

Obtain critical values $x = -7$ and $x = 1$

State answer $-7 < x < 1$

Q8:

EITHER: State or imply non-modular inequality $x^2 < (5+2x)^2$, or corresponding equation, or pair of linear equations $x = \pm(5+2x)$

Obtain critical values -5 and $-\frac{5}{3}$ only

Obtain final answer $x < -5, x > -\frac{5}{3}$

Q9:

State or imply $4 - 2^x = -10$ and 10

Use correct method for solving equation of form $2^x = a$

Obtain 3.81

Q10:

EITHER State or imply non-modular inequality $(3(x-1))^2 < (2x+1)^2$

or corresponding quadratic equation, or pair of linear equations $3(x-1) = \pm(2x+1)$

Make reasonable solution attempt at a 3-term quadratic, or solve two linear equations

Obtain critical values $x = \frac{2}{5}$ and $x = 4$

State answer $\frac{2}{5} < x < 4$