FP2 Inequalities Questions

June 2012

1. Find the set of values of \( x \) for which

\[
\left| x^2 - 4 \right| > 3x
\]

(5)

June 2011

1. Find the set of values of \( x \) for which

\[
\frac{3}{x+3} > \frac{x-4}{x}
\]

(7)

June 2010

3. (a) Find the set of values of \( x \) for which

\[
x + 4 > \frac{2}{x+3}
\]

(6)

(b) Deduce, or otherwise find, the values of \( x \) for which

\[
x + 4 > \frac{2}{|x+3|}
\]

(1)
6. (a) Use algebra to find the exact solutions of the equation

$$|2x^2 + 6x - 5| = 5 - 2x$$

(b) On the same diagram, sketch the curve with equation $y = |2x^2 + 6x - 5|$ and the line with equation $y = 5 - 2x$, showing the $x$-coordinates of the points where the line crosses the curve.

(c) Find the set of values of $x$ for which

$$|2x^2 + 6x - 5| > 5 - 2x$$
FP2 Inequalities Questions ANSWERS

June 2012

1. \( x^2 - 4 = 3x \) and \( x^2 - 4 = -3x \), or graphical method, or squaring both sides, leading to \( x = ... \)
   \((x = -4, \ x = -1) \quad x = 1, \ x = 4 \)
   \( \text{seen anywhere} \)
   Using only 2 critical values to find an inequality
   \( x < 1 \quad x > 4 \)
   \( \text{both strict, ignore ‘and’} \)

Notes

\[ 1^\text{st} \ M1 \ \text{accept } \pm(x^2 - 4) > 3x \text{ or } \pm(x^2 - 4) = 3x \text{ Require modulus of parabola and straight line with positive gradient through origin for graphical method.} \]
\[ 1^\text{st} \ B1 \ for \ x=1, \ 2^\text{nd} \ B1 \ for \ x=4 \]
\[ 2^\text{nd} \ M1 \ dependent \ upon \ first \ M1 \]
\[ A0 \ for \ error \ in \ solution \ of \ quadratic \ leading \ to \ correct \ answer. \]
June 2011

1. \[3x = (x - 4)(x + 3) \quad x^2 - 4x - 12 = 0\]
   \[x = -2, x = 6\]
   both
   Other critical values are \(x = -3, x = 0\)
   \(-3 < x < -2, \quad 0 < x < 6\)

   \(1^\text{st} \text{ M1 for } \pm (x^2 - 4x - 12) - =0 \text{ not required.}\)
   B marks can be awarded for values appearing in solution e.g. on sketch
   of graph or in final answer.
   \(2^\text{nd} \text{ M1 for attempt at method using graph sketch or } \pm/\)
   If cvs correct but correct inequalities are not strict award A1A0.

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June 2010

3(a) \[(x + 4)(x + 3)^2 - 2(x + 3) = 0, \quad (x + 3)(x^2 + 7x + 10) = 0 \text{ so } (x + 2)(x + 3)(x + 5) = 0\]
   or alternative method including calculator

   Finds critical values \(-2\) and \(-5\)

   Establishes \(x > -2\)

   Finds and uses critical value \(-3\) to give \(-5 < x < -3\)

   (b) \(x > -2\)
6
(a) \[2x^2 + 6x - 5 = 5 - 2x\]
\[2x^2 + 8x - 10 = 0\]
\[x^2 + 4x - 5 = 0\]
\[(x+5)(x-1) = 0\] or by formula
\[x = -5, x = 1\]

-2x^2 - 6x + 5 = 5 - 2x
2x^2 + 4x = 0
x = 0, x = -2

M1
A1
M1
A1
A1 (6)
B1 line
B1 quad curve
B1ft (on x-coords from (a)) (3)

(b) [Graph]

(c) x < -5, -2 < x < 0, x > 1

Special case: Deduct the last B mark earned if \(\leq\) or \(\geq\) used

[12]