chapter 7 **Algebra 3**

Section 7.2 Quadratic and rational inequalities

PROJECT MATHS **Text & Tests 6** 226

1. Quadratic inequalities

Example 1

Solve the inequality $x^2 - 2x - 8 \leqslant 0$.

Sketch:

$f(x) = x^2 - 2x - 8$

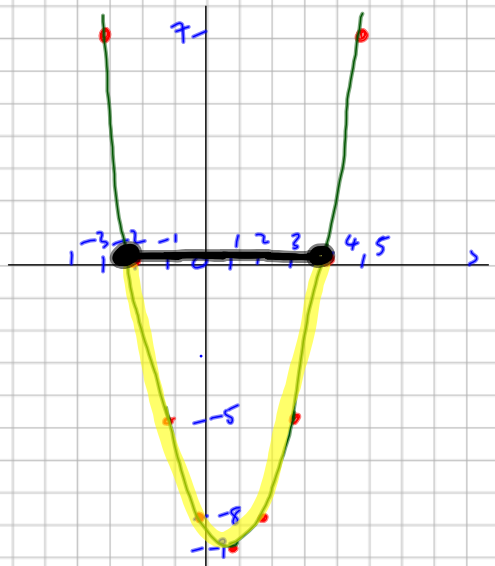
Solve:

$x^2 - 2x - 8 = 0$

$(x+2)(x-4) = 0$

$x = -2, \quad x = 4$

$(-3,7)$
$(-2,0)$
$(-1,-5)$
$(0,-8)$
$(1,-9)$
$(2,-8)$
$(3,-5)$
$(4,0)$
$(5,7)$



$-2 \leqslant x \leqslant 4$

1. Quadratic inequalities

Example 1

Solve the inequality $x^2 - 2x - 8 \leqslant 0$.

① Solve if $f(x) = 0$

$x^2 - 2x - 8 = 0$

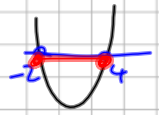
$(x + 2)(x - 4) = 0$

$x = -2, \quad x = 4$

either consider graph

② Is x inside or outside?

sketch



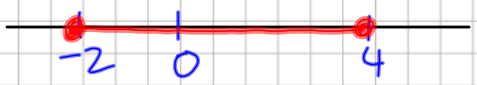
Inside ✓

$-2 \leq x \leq 4$

or zero test

② Is x inside or outside?

zero test



$x^2 - 2x - 8 \leq 0$

$(0)^2 - 2(0) - 8 = -8 \leq 0$ ✓ true

⇒ Since zero is inside, inside values work.

$-2 \leq x \leq 4$

2. Solve each of the following inequalities for x:

(i) $6 - x - x^2 \geqslant 0$ (ii) $12 - 5x - 2x^2 > 0$ (iii) $-2x^2 - 7x \geqslant 0$.

① Solve if $f(x) = 0$

$6 - x - x^2 = 0$

$-6 + x + x^2 = 0$

$x^2 + x - 6 = 0$

$(x + 3)(x - 2) = 0$

$x = -3, \quad x = 2$

② Inside or Outside?

Zero test

Sub 0 into origional function and get value

$6 - x - x^2 = 6 - 0 - 0^2 = 6 \geq 0$ ✓

0 is true

0 inside −3 and 2

⇒ inside works

③ Write Solution:

$-3 \leq x \leq 2$