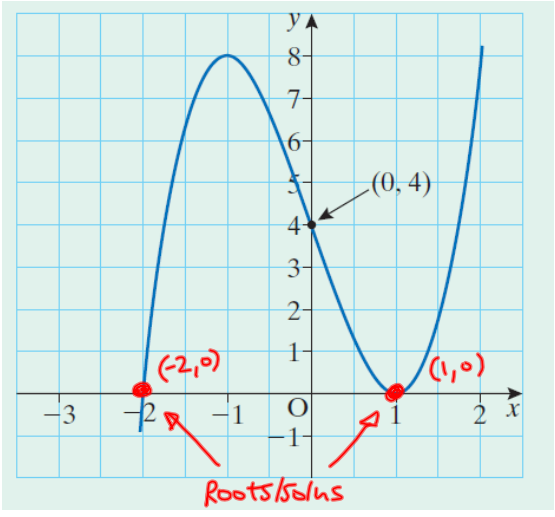
chapter 2 **Algebra 2**

Section 2.10 Graphs of cubic polynomials

PROJECT MATHS **Text & Tests 6**

Example 1

By examining the graph, find an expression for this cubic polynomial.



Solns are $x = -2, x = 1, x = 1$

factors: $(x+2)(x-1)(x-1)$

$f(x) = k(x+2)(x-1)(x-1)$

$f(0) = k(0+2)(0-1)(0-1) = 4$

$\Rightarrow k(2)(-1)(-1) = 4$

$2k = 4$

$k = 2$

$f(x) = 2(x+2)(x-1)(x-1)$

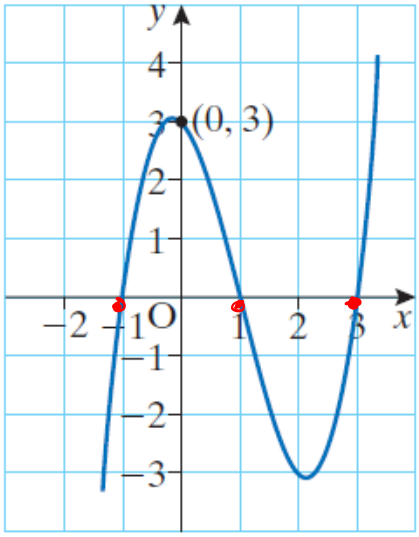
$f(x) = (2x+4)(x^2-2x+1) = 2x^3 - 4x^2 + 2x + 4x^2 - 8x + 4$

$f(x) = 2x^3 - 6x + 4$

Exercise 2.10

1. Find a cubic expression for each of the following graphs, giving your answers in the form $f(x) = ax^3 + bx^2 + cx + d$.

(i)



Roots: $x=-1$, $x=1$, $x=3$

factors: $(x+1)(x-1)(x-3)$

$\Rightarrow f(x) = k(x+1)(x-1)(x-3)$

Sub in $(0,3)$

$f(0) = k(0+1)(0-1)(0-3) = 3$

$3k = 3 \Rightarrow k = 1$

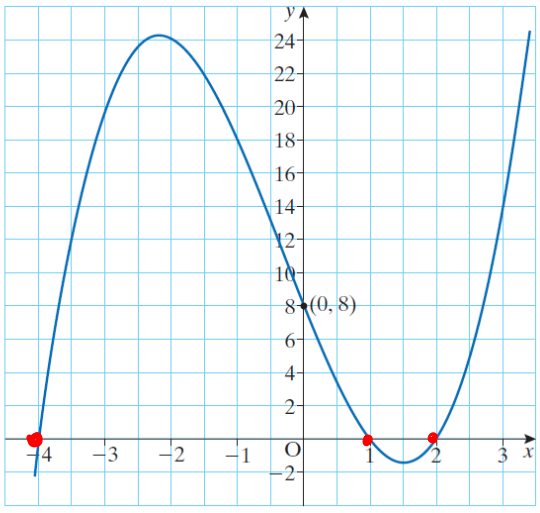
$\Rightarrow f(x) = (x+1)(x-1)(x-3)$ notice DOTS!

$= (x^2-1)(x-3)$

$f(x) = x^3 - 3x^2 - x + 3$

1. Find a cubic expression for each of the following graphs, giving your answers in the form $f(x) = ax^3 + bx^2 + cx + d$.

(ii)



Roots: $x=-4$, $x=1$, $x=2$

factors: $(x+4)(x-1)(x-2)$

$\Rightarrow f(x) = k(x+4)(x-1)(x-2)$

Sub in $(0,8)$

$f(0) = k(0+4)(0-1)(0-2) = 8$

$\Rightarrow 8k = 8 \Rightarrow k = 1$

$\Rightarrow f(x) = (x+4)(x-1)(x-2)$

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

$= (x-2)(x^2+3x-4)$

$= x^3 + 3x^2 - 4x - 2x^2 - 6x + 8$

$f(x) = x^3 + x^2 - 10x + 8$