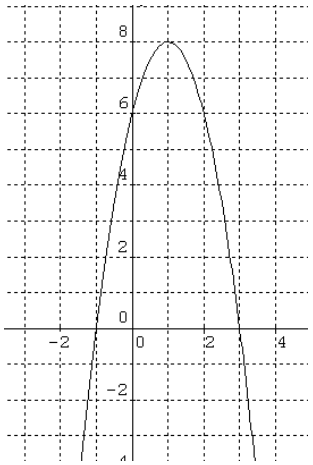
Determining an Equation from a Graph

Example 1: Determine an equation of function shown.



From the graph, the roots are –1 and 3, which yield factors of $(x + 1)$ and $(x – 3)$.

So $f(x) = a(x+1)(x-3)$, where a is an unknown constant. To determine a, we substitute a known point and solve. The y-intercept is 6, so:

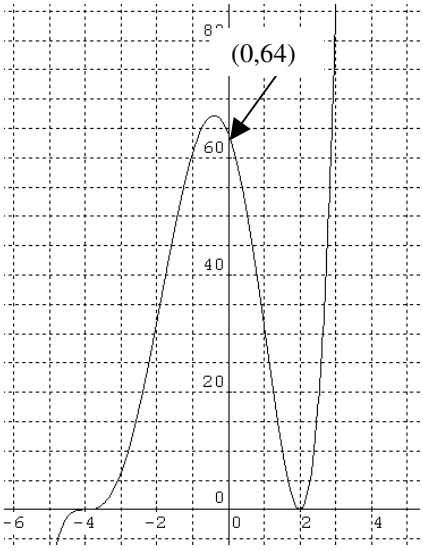
$6 = a(0+1)(0-3)$

$6 = -3a$

$-2 = a$

Thus the equation is $f(x) = -2(x+1)(x-3)$.

Example 2: Determine an equation of function shown.



Examining the behaviour around the x-intercepts, we see that the root –4 is (at least) order 3 and the root of 2 is (at least) order 2.

This yields $f(x) = a(x+4)^3(x-2)^2$.

Substituting the y-intercept, we get:

$64 = a(0+4)^3(0-2)^2$

$64 = 256a$

$a = \frac{1}{4}$

Therefore $f(x) = \frac{1}{4}(x+4)^3(x-2)^2$

Homework: pg. 92 #3 (find the equation, too!)