

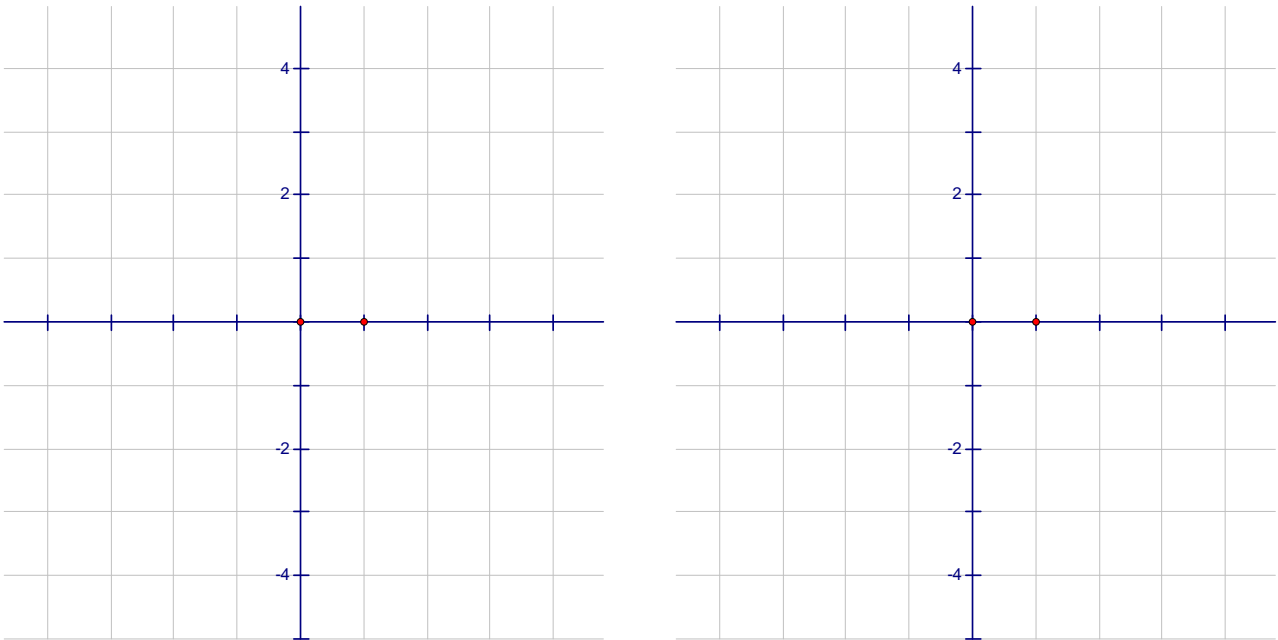
Special Property of Cubic Functions with Three Distinct Zeros Discovery Activity

Purpose: This is a discovery exercise. It is about tangent lines and zeros of polynomial functions.

1. Given the 3rd degree polynomial functions

$$f(x) = x^3 - 4x^2 + x + 6 \text{ and } g(x) = 2x^3 + 5x^2 - 2x - 5$$

a) Graph the cubic polynomial functions f and g and notice that each has 3 distinct zeros.



b) Calculate the average of any two zeros from the function f . Call the average z .

c) Graph the tangent line at the point $(z, f(z))$. Where does the tangent line cross the x -axis?

d) Calculate the average, v , of another pair of zeros from the function f and note where the tangent line at $(v, f(v))$ crosses the x -axis.

e) Complete a) – d) for the function g .

f) State a general property shared by cubic functions with 3 distinct zeros. Make up your own cubic function with three distinct zeros and test your property. Does your property hold?