

Mastering Mathematics Smartly

By Wee Wen Shih

weews.yolasite.com

Article: Determining the roots of an equation

One part of curve sketching question may ask students to determine the number of real roots of an equation.

The approach usually requires one to:

1. carry out some manipulations algebraically,
2. insert an additional graph,
3. determine the number of intersections between two graphs.

For example, suppose we have already sketched the graph of $y = \frac{x^2 - 7x + 13}{x - 2}$. Now we wish to determine the number of real roots of the equation $x^4 - 2x^3 - x^2 + 7x - 13 = 0$.

Applying step 1:

$$x^3(x - 2) = x^2 - 7x + 13$$

$$\Rightarrow x^3 = \frac{x^2 - 7x + 13}{x - 2}$$

Applying step 2: We insert the graph of $y = x^3$.

Applying step 3: From the sketch (go activate your GCI!), both graphs intersect at two places, so the equation has two real roots.