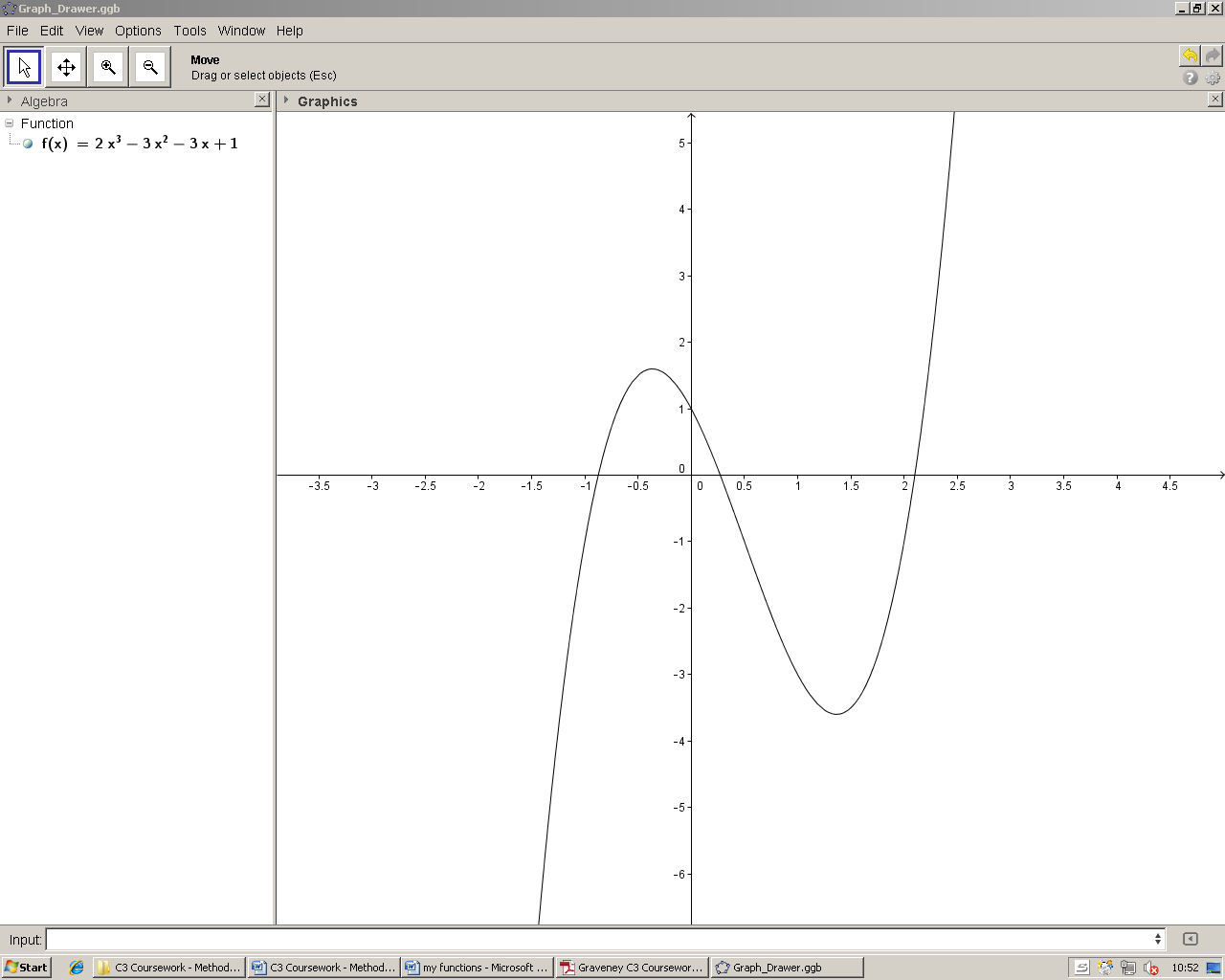
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| C3 Coursework |
| Methods for Solving Equations |
| By Norbert Podsadowski (Candidate 8745) |

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| 2015  For the OCR Mathematics (MEI) specification |

Method 1: Decimal search (change of sign)

Equation 1:



y

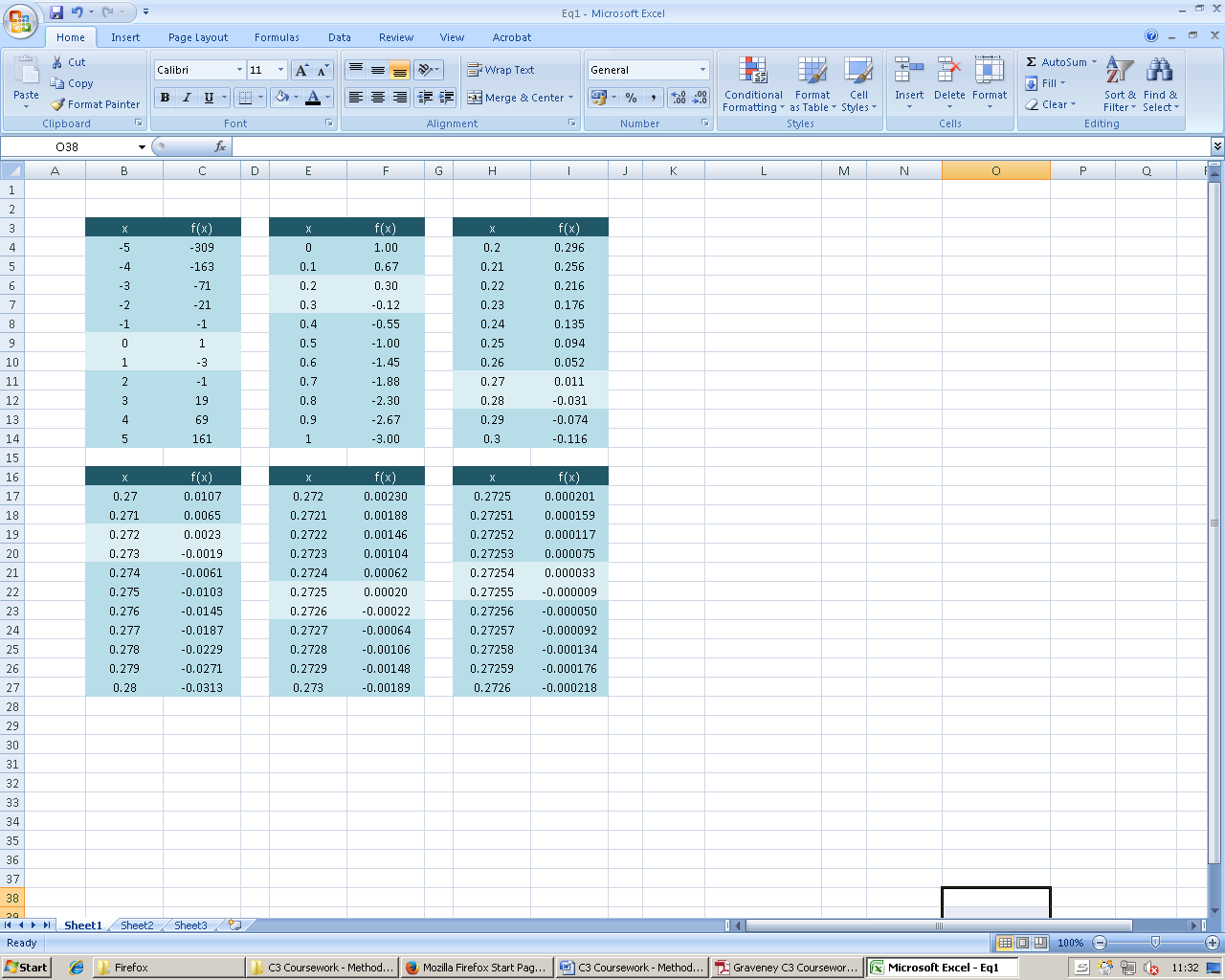
x

Root 3

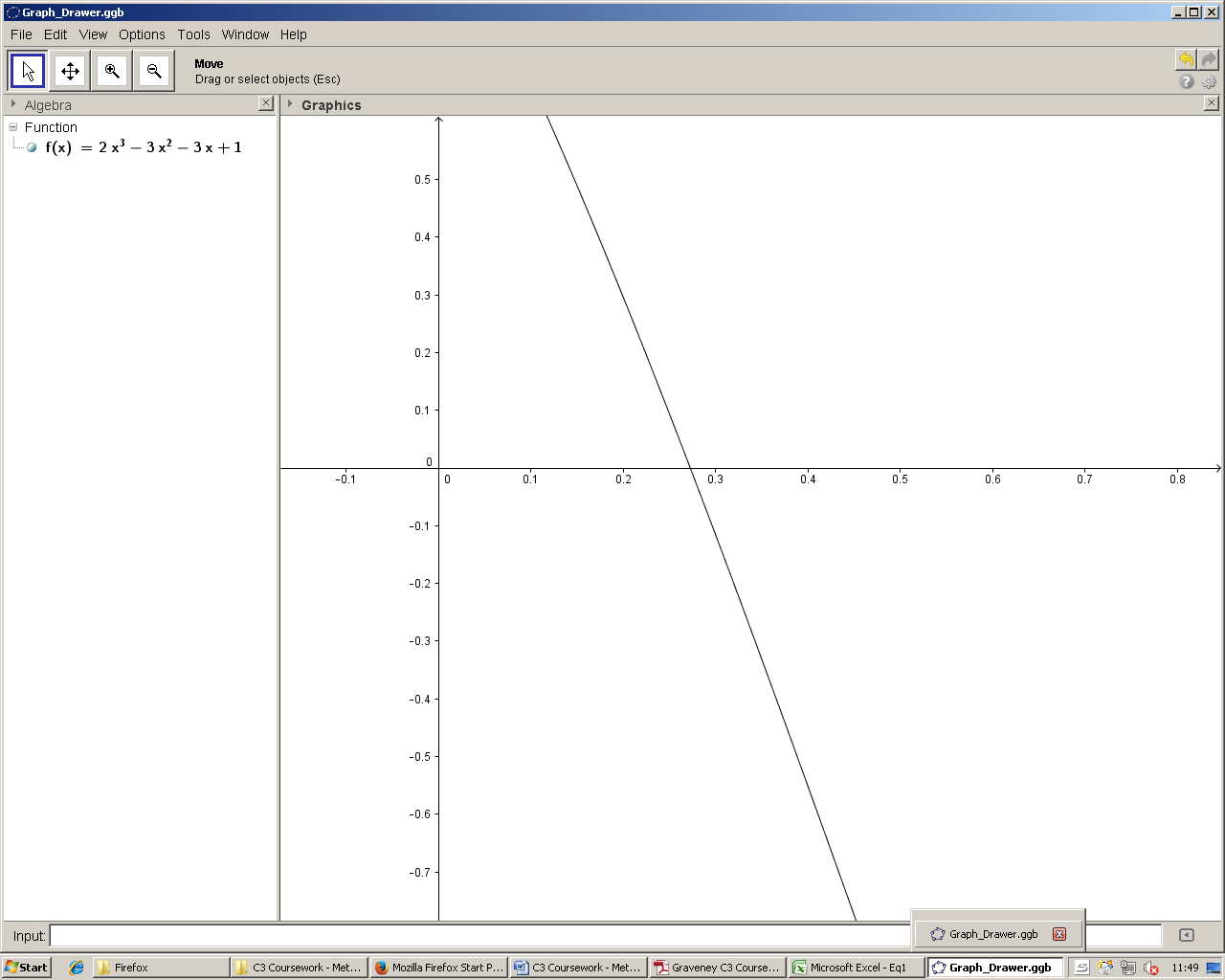
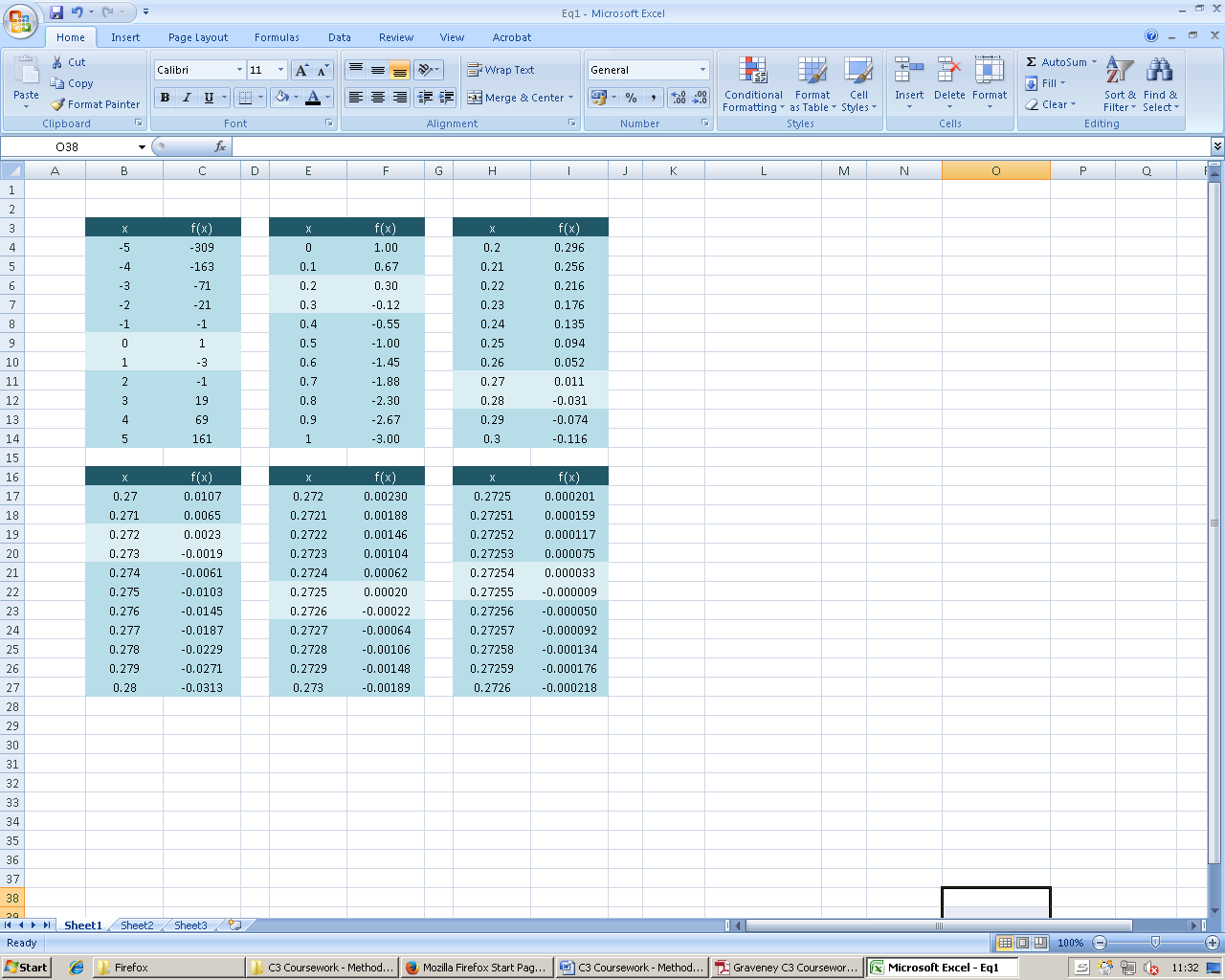
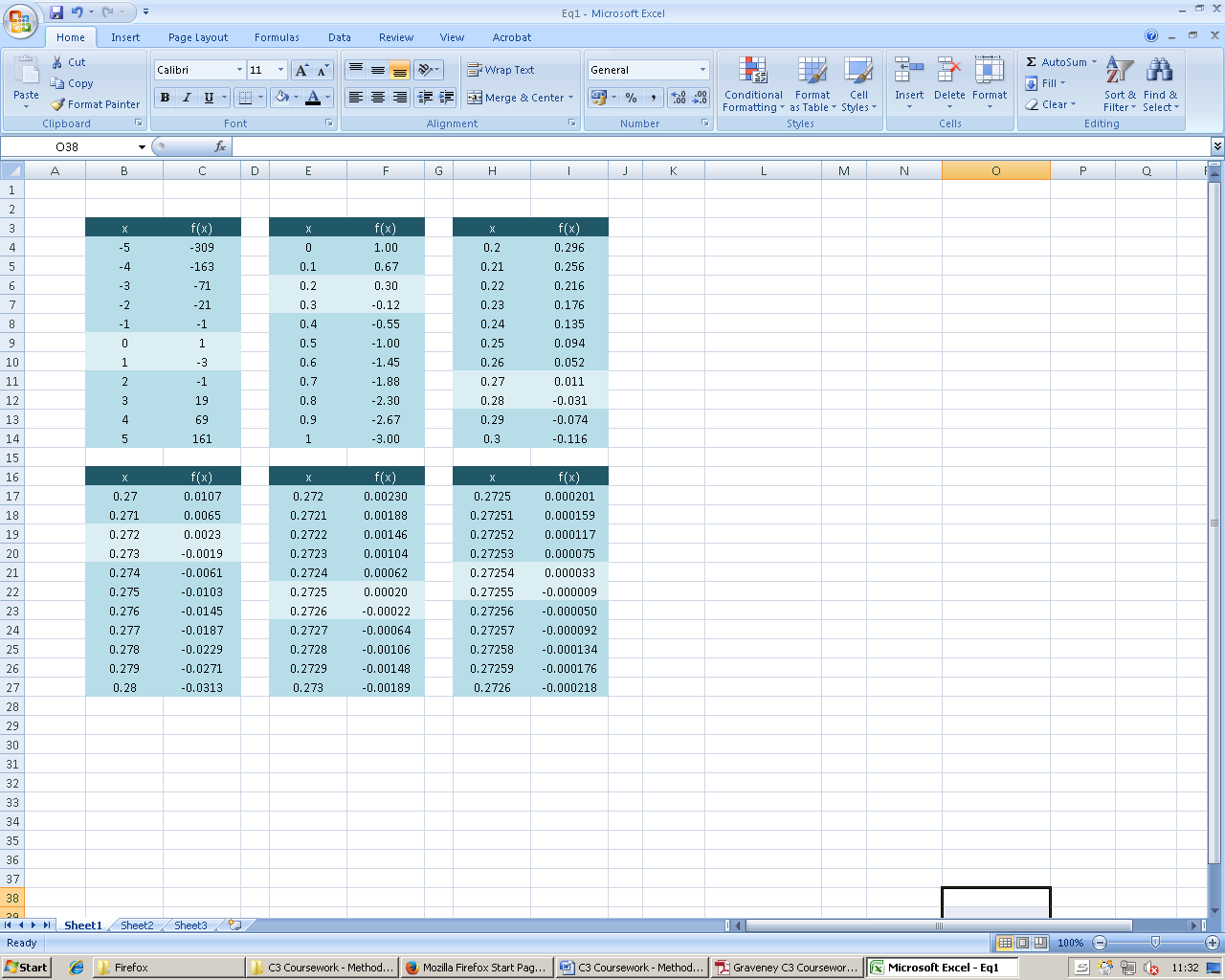
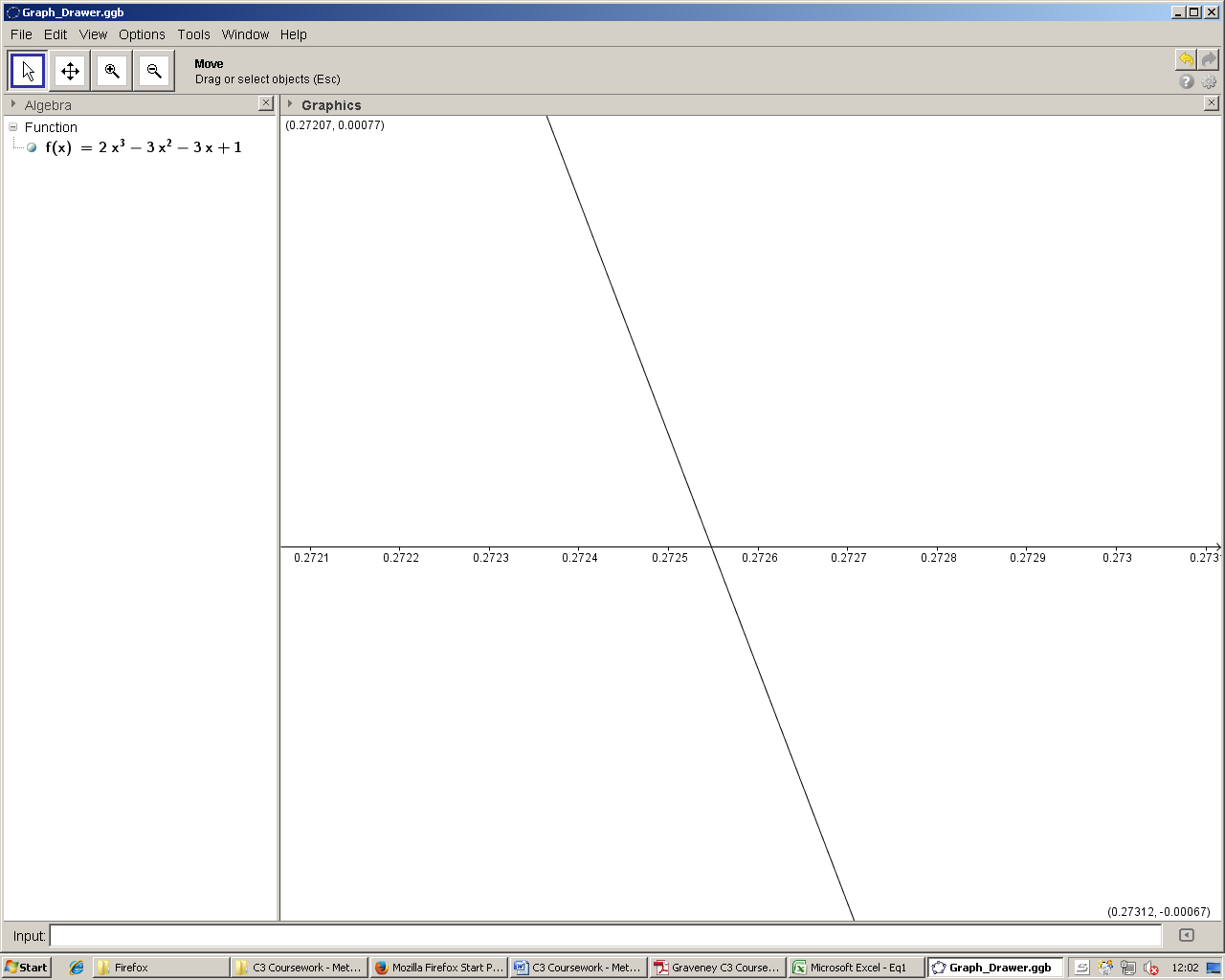
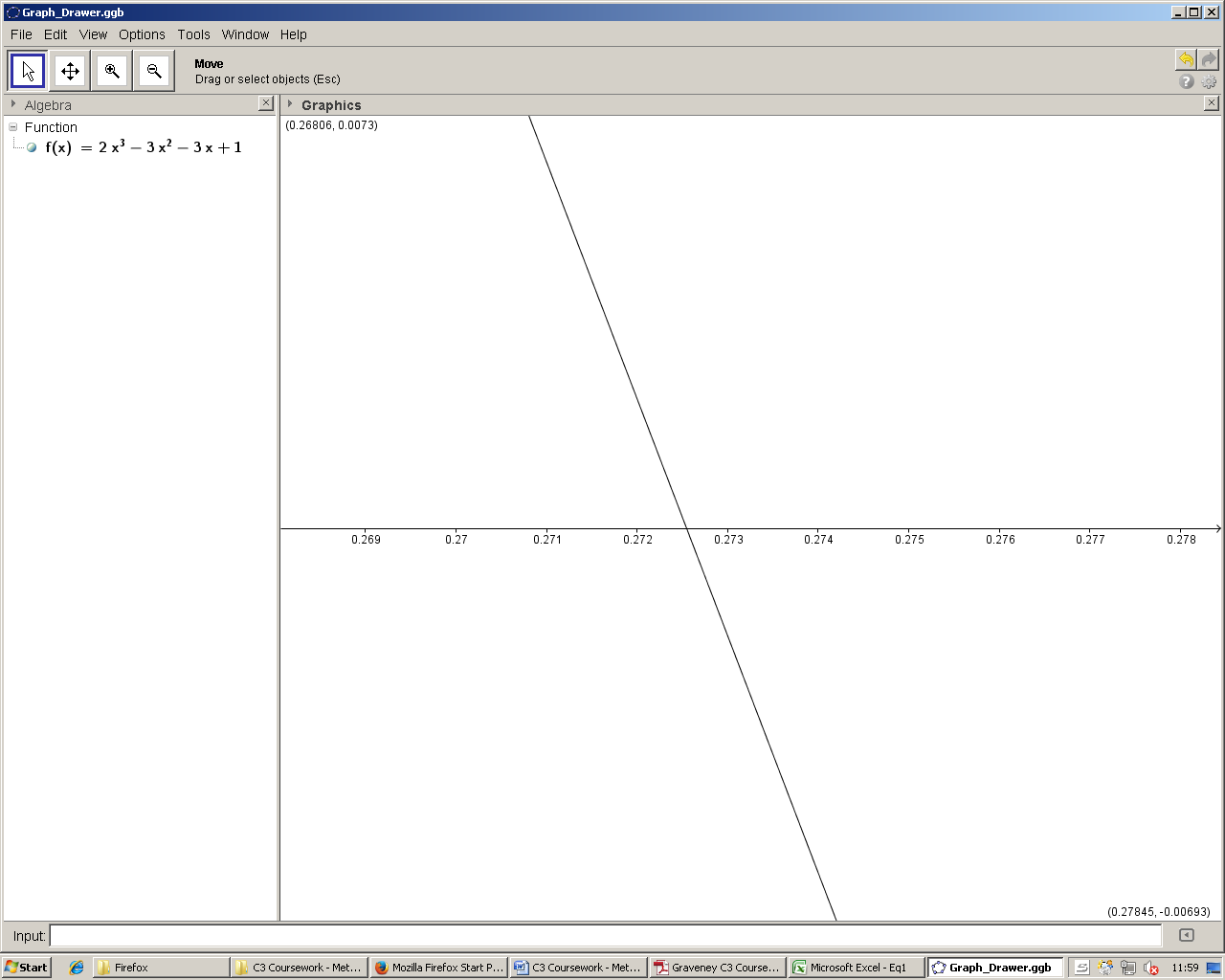
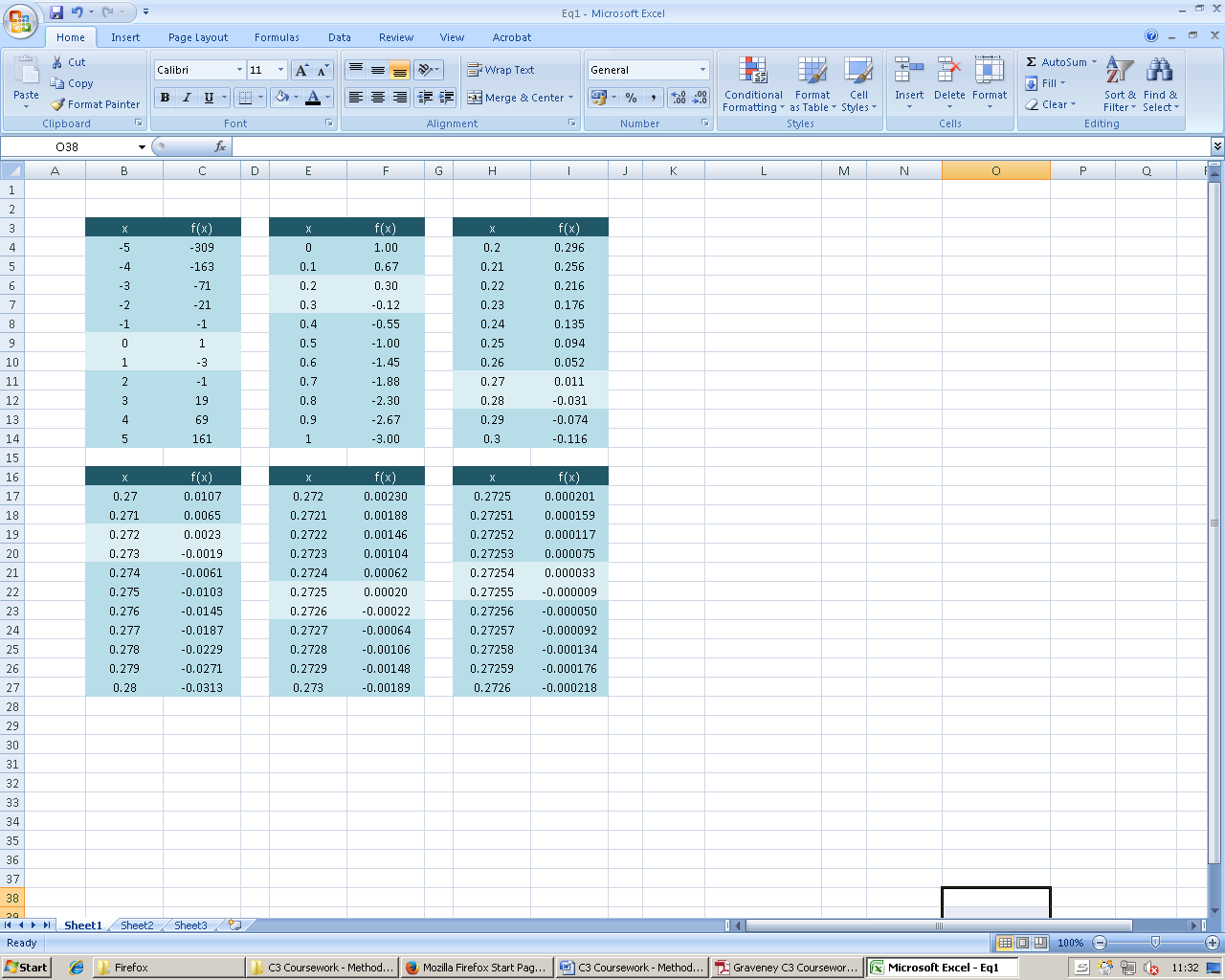
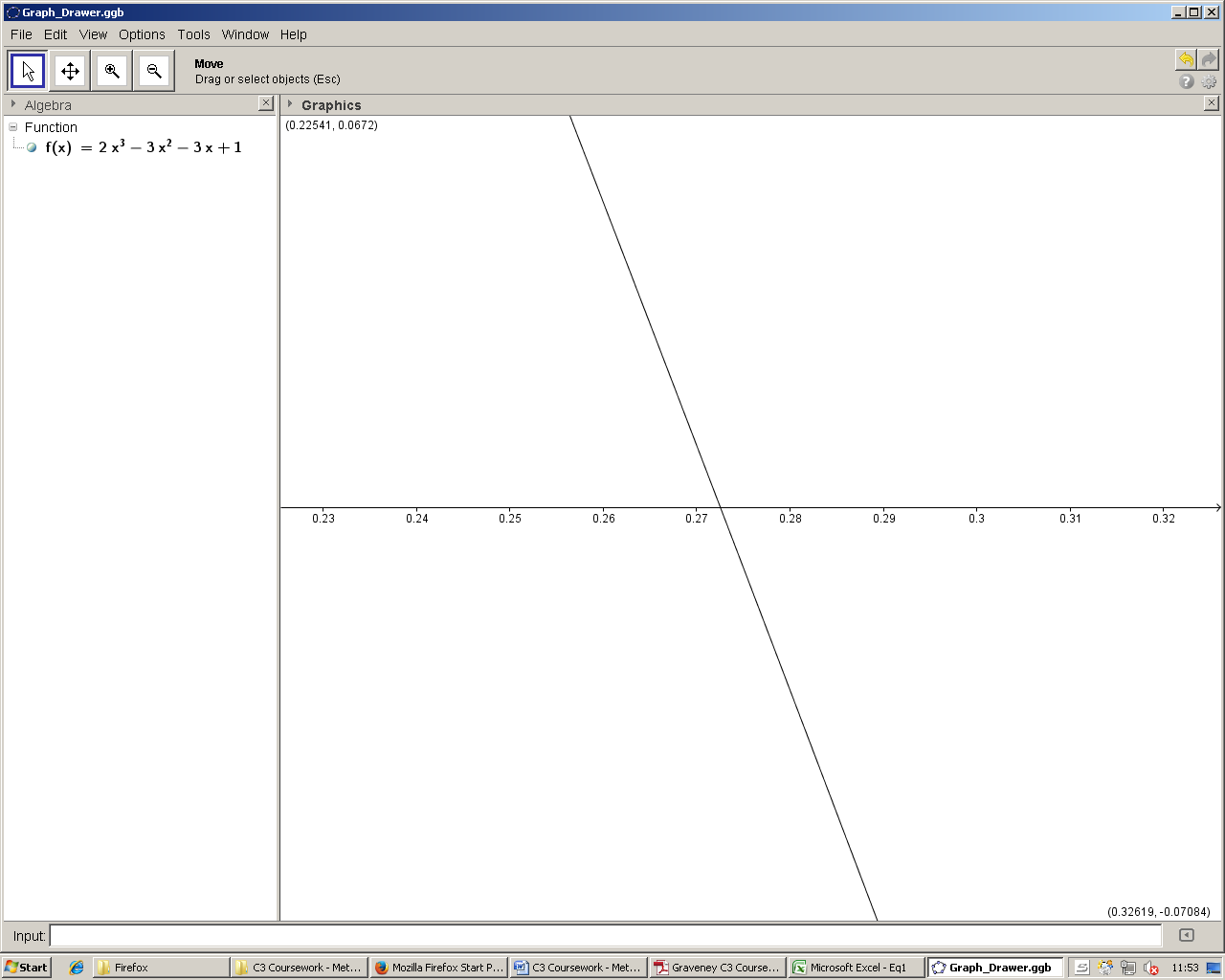
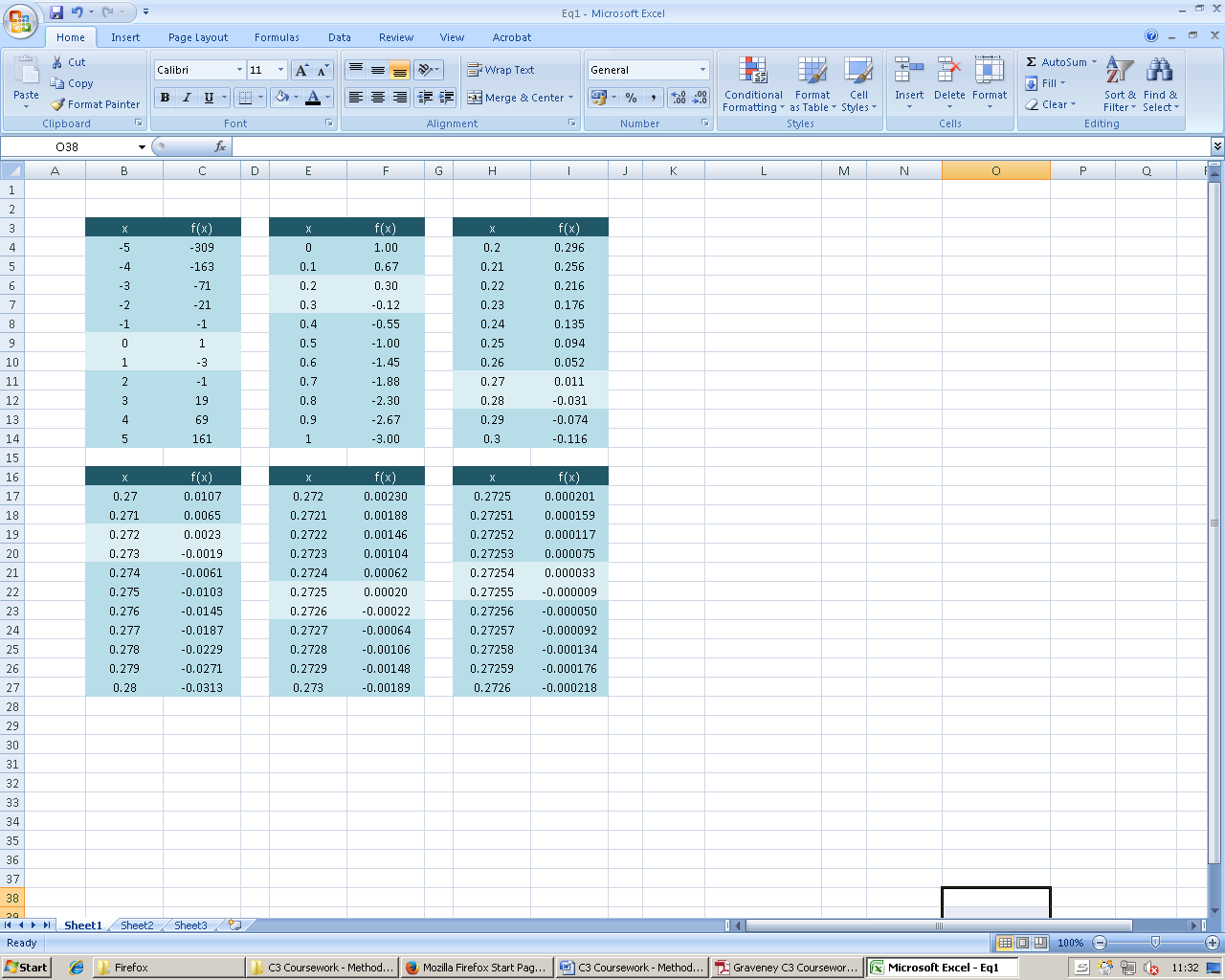
Root 2

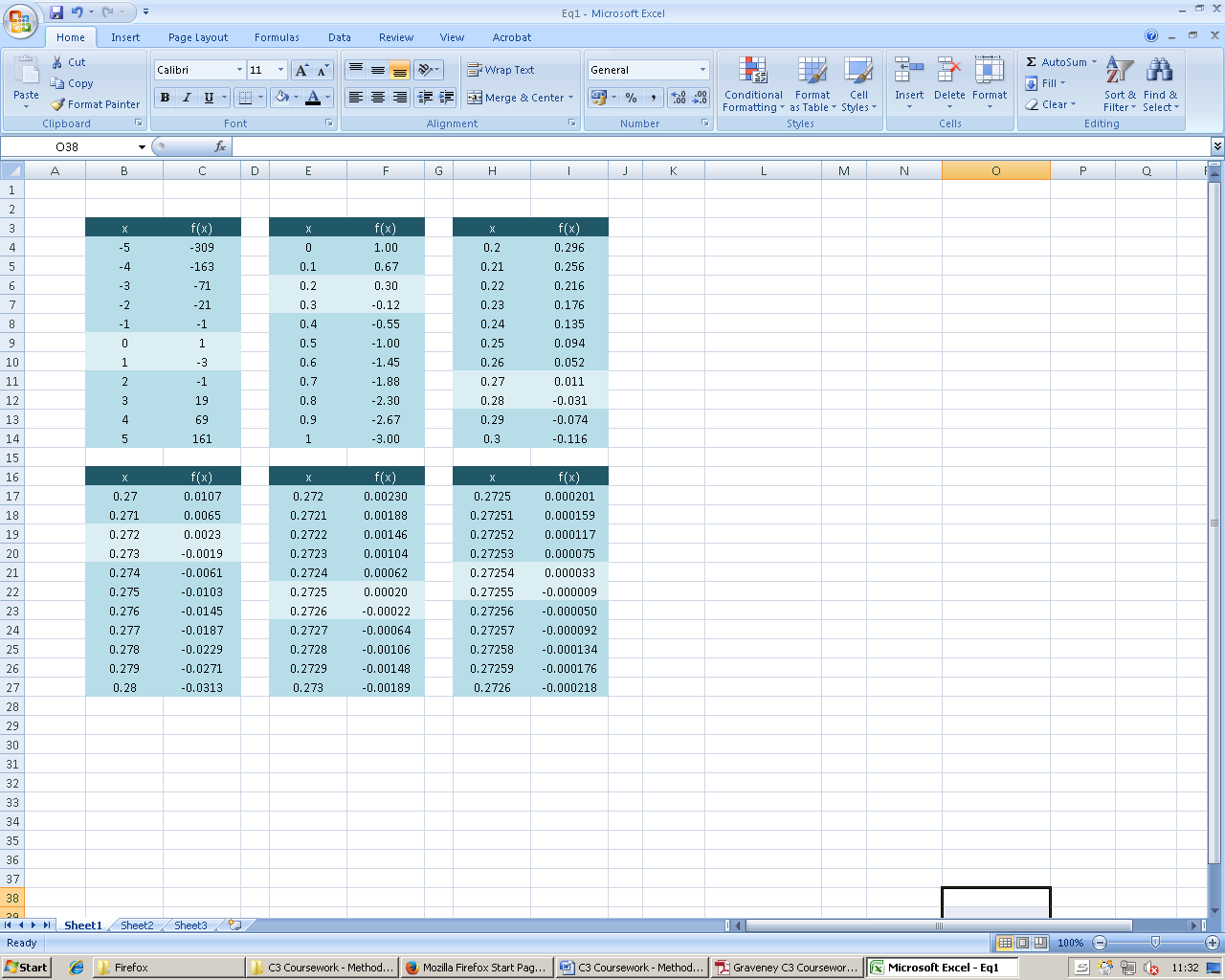
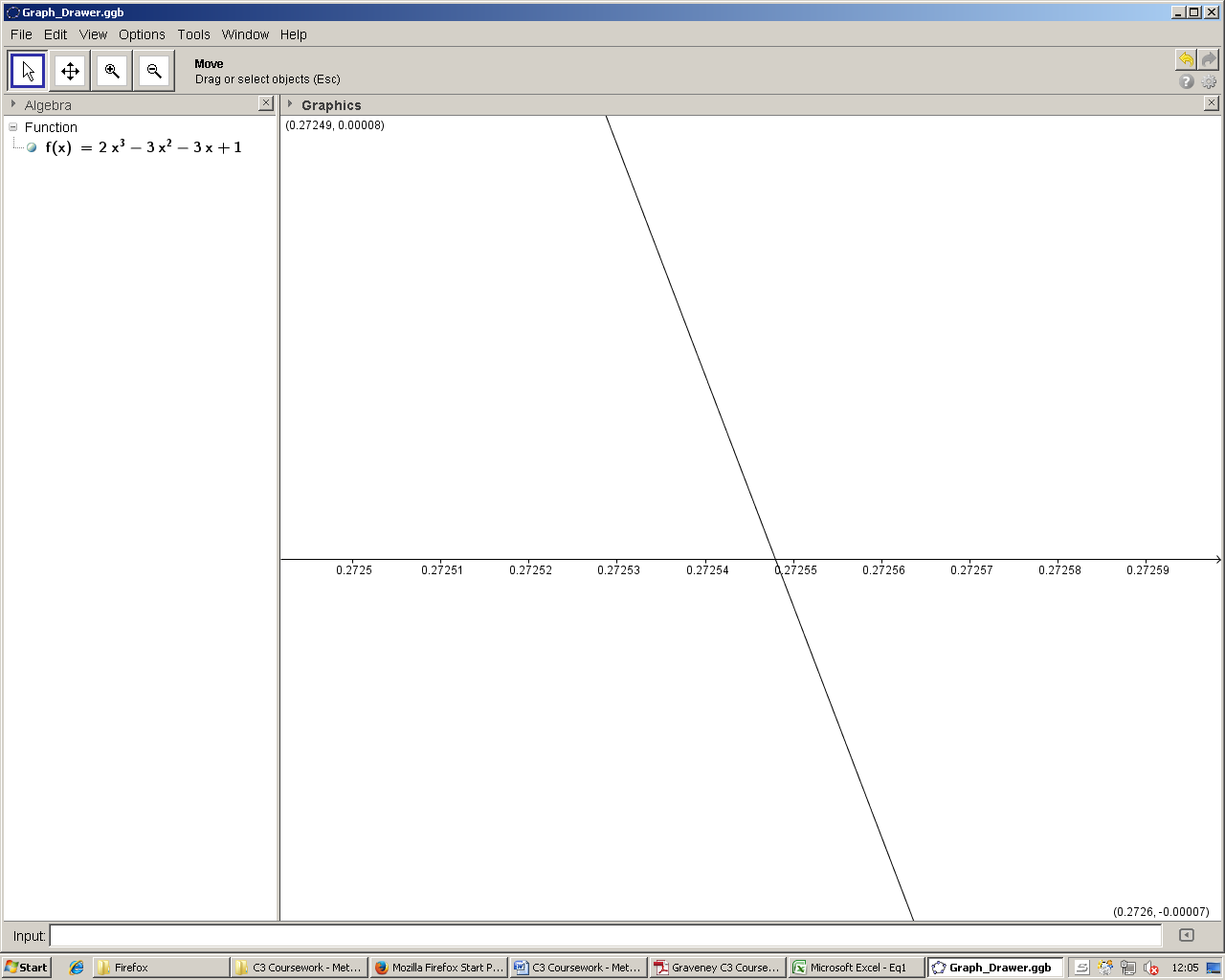
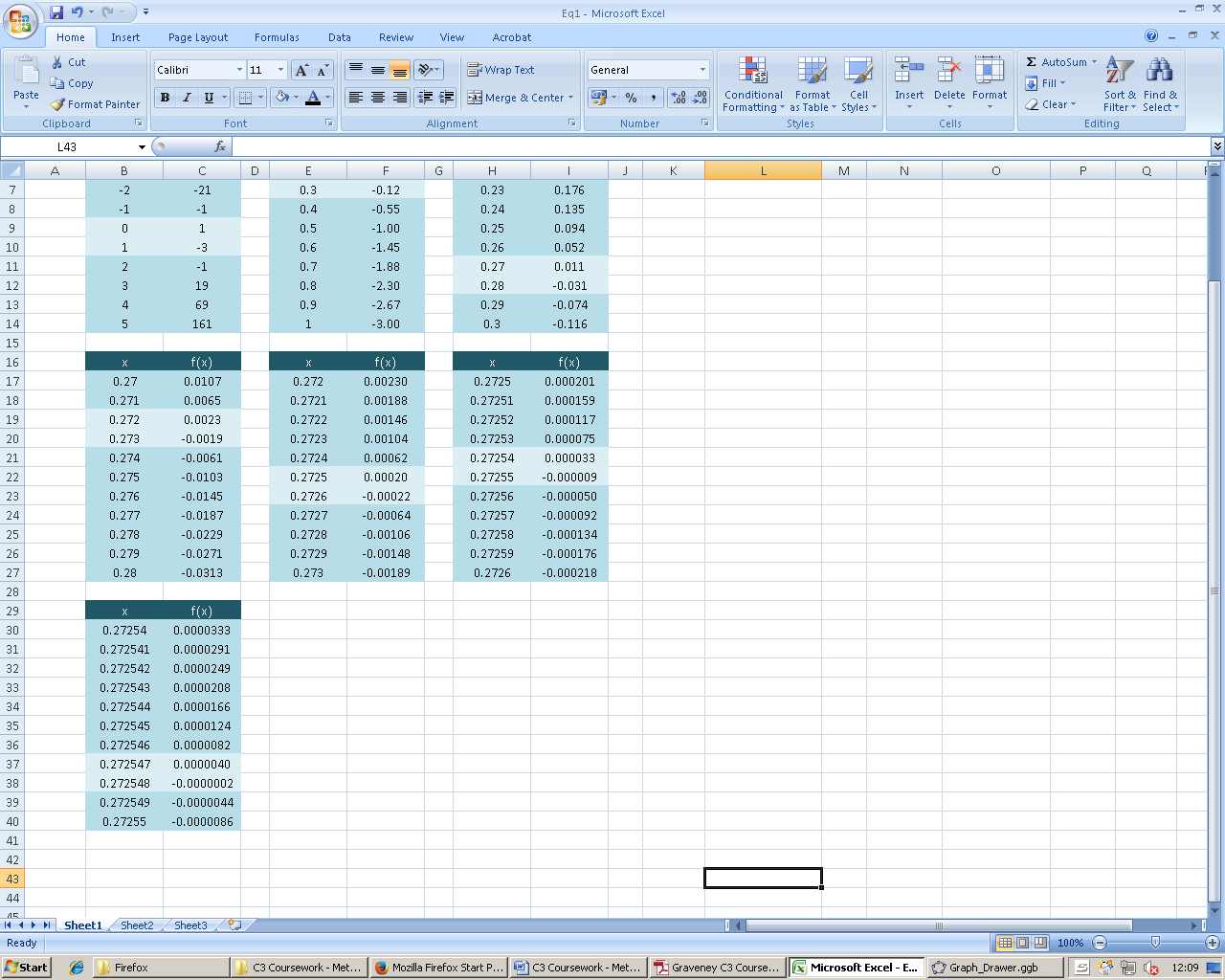
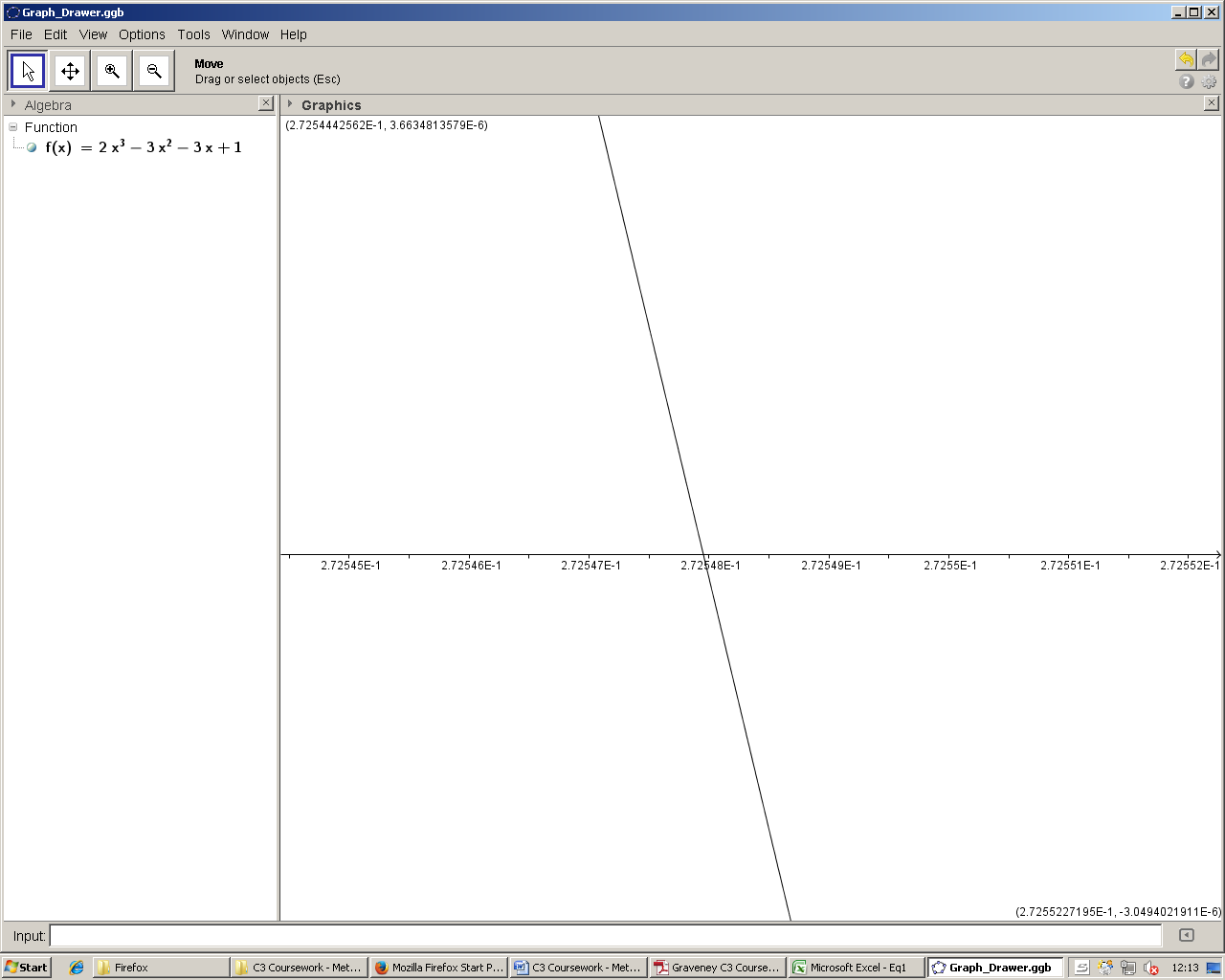
Root 1

This method involves looking for a change of sign between intervals. For the first table of values, an interval is used with a “step” of 1. If a change of sign occurs during this interval, another interval is used between the x-values at which the change of sign occurred, with its “step” decreased by a factor of 10 (i.e. 0.1 for the second table, 0.01 for the third, etc.). This process is repeated until the desired root is found to the desired degree of accuracy.



This is the first table of the decimal search for the function above. I will be demonstrating how Root 2 is found. Using a spreadsheet, I chose an interval of [-5, 5] and sequentially evaluated the function at x = -5, x = -4, and so on. I found that the sign changes at three different points – between [-1, 0], [0, 1] and [2, 3] for Root 1, 2 and 3 respectively. As I am only looking for Root 2, the interval for my next table will be [0, 1].





After 7 tables of values, we have done honed onto the root, which is 0.27255 to 5 significant figures.

The error bounds are .