

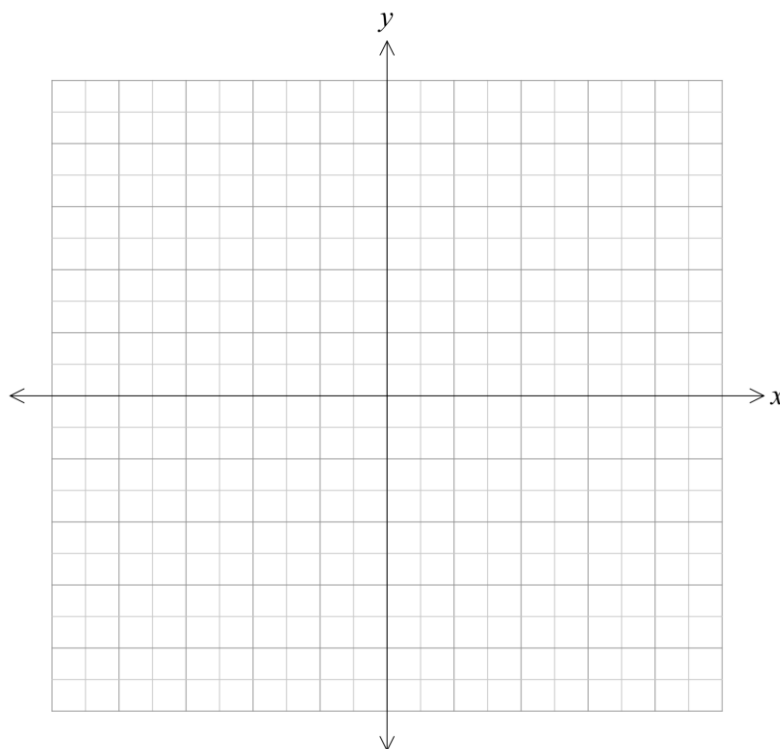
Functions & Graphs Part 1

How to on a TI-nspire CX CAS Calculator

Each of the questions included here can be solved using the TI-Nspire CAS

Question: 1.

Sketch $y = -x^3 - 4x^2 + x + 8$ showing the coordinates of any axial intercepts, stationary points and points of inflection correct to 2 decimal places.



Question: 2.

Find the maximal domain of the function $y = -\frac{5}{x^2 - 6x + 9} + 2$.

Question: 3.

For the function $y = \frac{5x-3}{x+3}$, at the point where $x = 1$, find the equation of:

(i) the tangent line in the form $y = mx + c$.

(ii) the normal line in the form $ax + by = c$, where $a, b \in \mathbb{Z}^+$.

Question: 4.

Find the set of values of k for which $-x^2 + 4x - k + 1 = 0$ has no real solutions.

Question: 5.

Find the coordinates of the stationary points of the function $f(x) = (x - \sqrt{2})^3(x + 4) + 15$ and state their nature.

Question: 6.

Find the product of the x-intercepts of the function $g(x) = 2x^4 - x^3 - 27x^2 + 12x + 36$.

Question: 7.

Find the equation of the cubic function in the form $y = ax^3 + bx^2 + cx + d$ that has maximal domain and passes through the points $\left(-2, \frac{28}{3}\right)$, $(0, 4)$, $(3, -14)$ and $(6, 4)$.

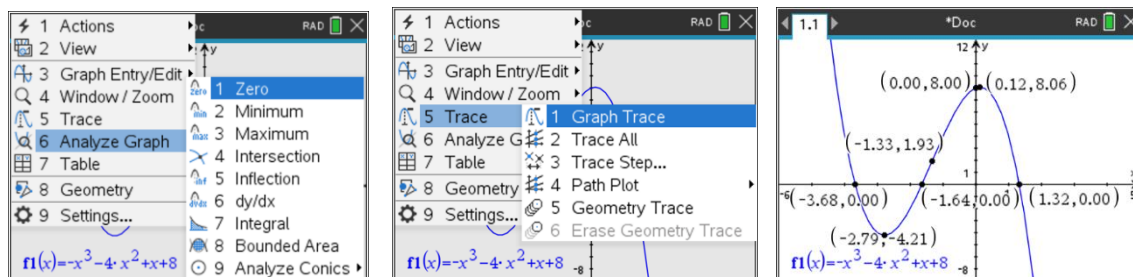
Question: 8.

Find the coordinates of the points of intersection of the functions $y = 2x - 4$ and $y = x^4 - 3x^2 - 4$.

Answers

Question 1

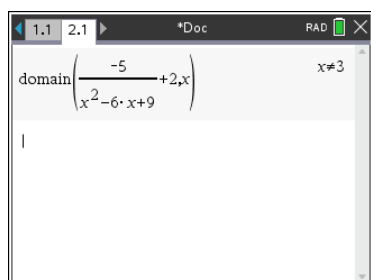
The points of interest were found using menu>6 Analyze Graph or 5 Trace and then selecting the appropriate menu item.



To set the coordinates of the points to two decimal places select menu>9:Settings and Status and set Display Digits: to FIX 2. Float displays the number of significant figures. There is a different Settings and Status menu for a Calculator Page and a Graphs Page.

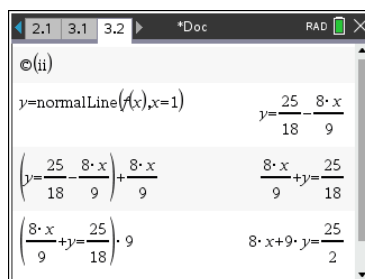
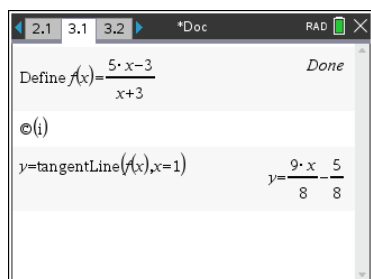
Question 2

Solution: $x \in \mathbb{R} \setminus \{3\}$



The domain() CAS function is found in the catalog.

Question 3

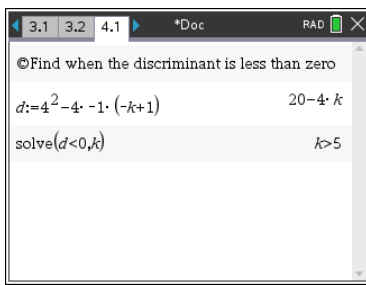


The tangentLine() and normalLine() CAS functions are found when on a Calculator Page menu>4 Calculus>9 Tangent Line or A Normal Line or in the catalog.

The normal line is perpendicular to the tangent line.

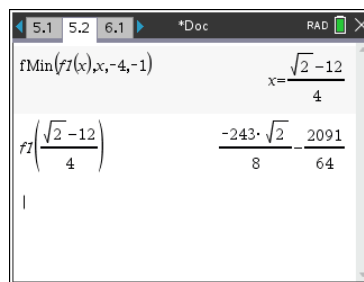
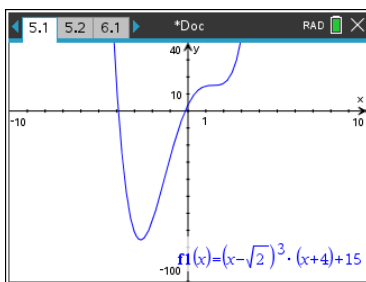
Rearranging an equation can be performed on CAS. The first line was found by entering $+\frac{8x}{9}$ and the second line entering $\times 9$.

Question 4



Question 5

Sketch the graph first to see its shape.

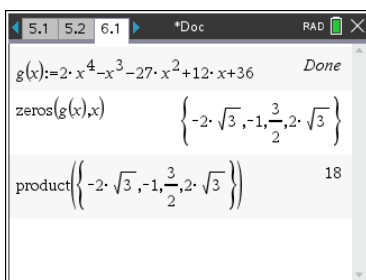


The cubic factor indicates that this is a stationary point of inflection and is at $(\sqrt{2}, 15)$.

Looking at the graph $\left(\frac{\sqrt{2}-12}{4}, \frac{-243\sqrt{2}}{8} - \frac{2091}{64}\right)$ is an absolute minimum stationary point.

fMin() is found menu>4 Calculus>7 Function Minimum. This CAS function only gives the x-value of the minimum point in the interval.

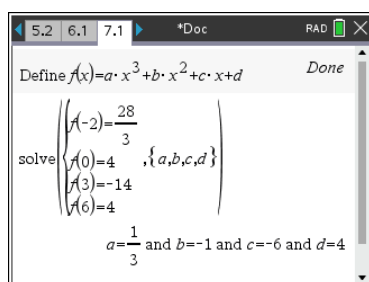
Question 6



The product of the x-intercepts is 18.

The product() function is found in the catalog.

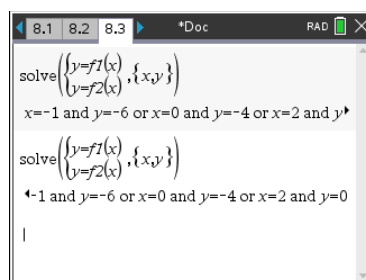
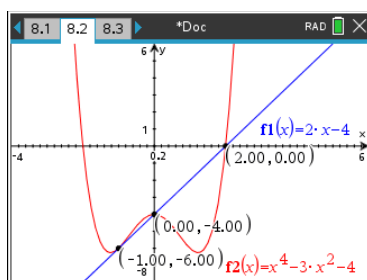
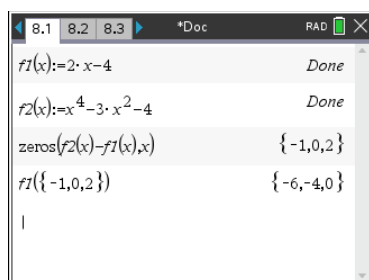
Question 7



The cubic equation is $y = \frac{1}{3}x^3 - x^2 - 6x + 4$.

On a Calculator Page the Solve System of Equations template was used from the Algebra menu. This method is much quicker than substituting the points into the general equation in terms of the parameters and solving. Remember that a multiplication symbol must be placed between a parameter and a variable. d could have been replaced with 4 as $(0, 4)$ is the y-intercept.

Question 8



The solutions are $(-1, 0)$, $(0, -4)$ and $(2, 0)$.

The zeros() command solution gives the x-values in an array which can be easily substituted into the function and displayed much clearer to the solve() command solution.

The functions were defined as $f1(x)$ and $f2(x)$ so the rules would automatically appear on the Graphs Page entry line.

On the Graphs Page all 3 intersection points were found in one step, menu > 8 Geometry > 1 Points & Lines > 4 Intersection Point(s) and then select each graph.