# VCE MATHEMATICAL METHODS UNITS 1 & 2 – ESSENTIAL CAS CALCULATOR SKILLS

INCL. WORKED EXAMPLES & AN END-OF-YEAR SKILLS CHECKLIST

Reference CAS calculator: Texas Instruments TI-Nspire CAS II

# Contents

# Topic chapters

## Chapter 1 – Lines and Linear Relationships

### Solving linear equations and inequalities

*Q: Solve the equation* $\frac{x-3}{2} - \frac{2x-4}{3} = 5$.

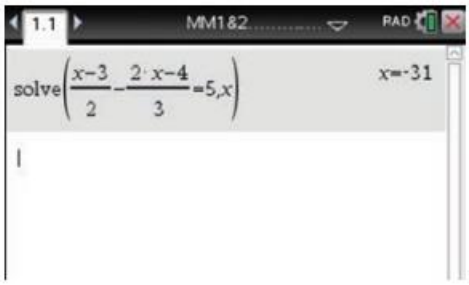
*A:*

**Using the TI-Nspire**

- To find the solution to the linear equation, use a **Calculator** application.
- Select (menu) > **Algebra** > **Solve**.
- Enter the equation

$$\frac{x-3}{2} - \frac{2x-4}{3} = 5$$

- Press (enter) to obtain the solution.




Note: A template for fractions may be obtained by pressing (ctrl) (÷).

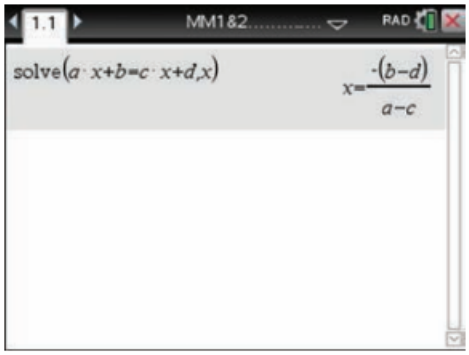
*Q: Solve the equation* $ax + b = cx + d$ *for* $x$.

*A:*

**Using the TI-Nspire**

- To solve the literal equation $ax + b = cx + d$, use a **Calculator** application.
- Select (menu) > **Algebra** > **Solve**.
- Enter $ax + b = cx + d$ as shown.
- Press (enter) to obtain the solution.

Note: Ensure a multiplication sign is placed between the letters of the expression, otherwise the calculator will read them as a single variable rather than a product. That is, enter $a \times x$ and not $ax$.




*Q: Solve the inequality* $\frac{2x+3}{5} > \frac{3-4x}{3} + 2$.

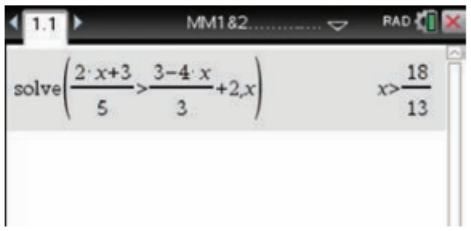
*A:*

## Using the TI-Nspire

The inequality can be solved in a **Calculator** application.

- Choose **solve( )** from the **Algebra** menu to give the solution to

$$\frac{2x+3}{5} > \frac{3-4x}{3} + 2$$




Note: For the inequality signs template, press ctrl =.

### Solving simultaneous equations

*Q: Solve the equations* $2x - y = 4$ *and* $x + 2y = -3$.

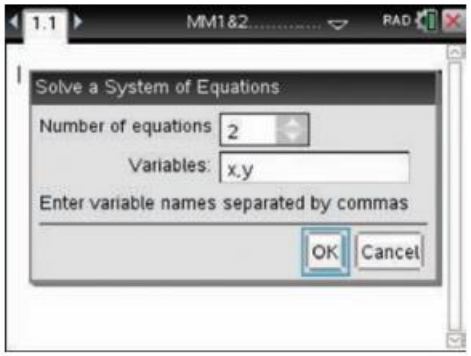
*A:*

## Using the TI-Nspire

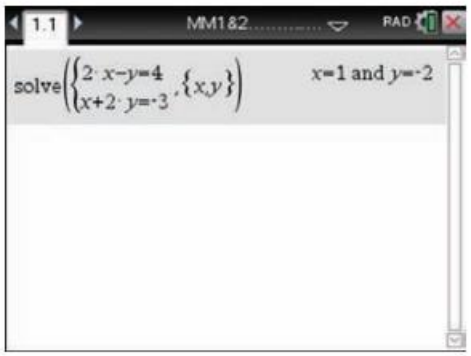
Calculator application

Simultaneous equations can be solved in a **Calculator** application.

- Use menu > **Algebra** > **Solve System of Equations** > **Solve System of Equations**.
- Complete the pop-up screen.




- Enter the equations as shown to give the solution to the simultaneous equations $2x - y = 4$ and $x + 2y = -3$.




Note: The solution can also be found with solve($2x - y = 4$ and $x + 2y = -3, x, y$).

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### Graphing linear equations

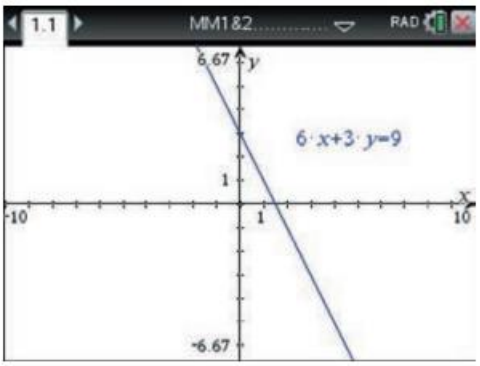
*Q: Sketch the graph of* $6x + 3y = 9$.

*A:*

## Using the TI-Nspire

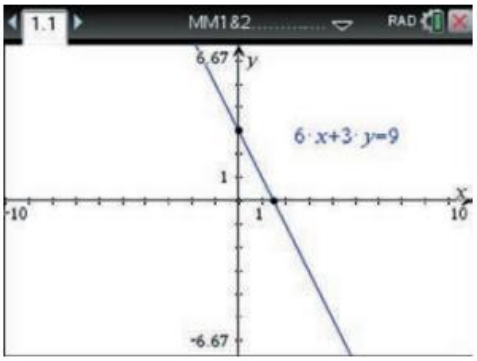
To sketch the graph of $6x + 3y = 9$:

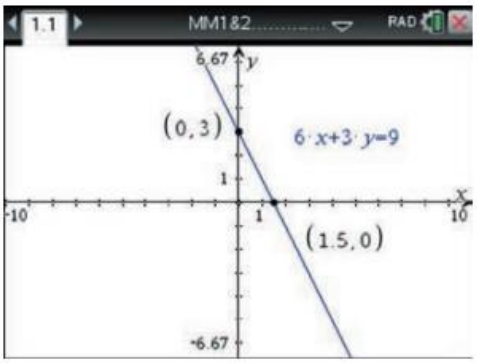
- Open a **Graphs** application: press (on) and select the **Graphs** icon, or use (ctrl) (I) and select **Add Graphs**.
- Equations of the form $ax + by = c$ can be entered directly using (menu) > **Graph Entry/Edit** > **Equation** > **Line**. Enter as $6x + 3y = 9$.




Note: The window settings ( (menu) > **Window/Zoom** > **Window Settings**) will have to be changed if the axis intercepts do not appear on the screen.

- The axis intercepts can be found using (menu) > **Geometry** > **Points & Lines** > **Intersection Point(s)**. Select the $x$-axis and the graph to display the $x$-axis intercept. Select the $y$-axis and the graph to display the $y$-axis intercept.
- To show the coordinates of these points, use (menu) > **Actions** > **Coordinates and Equations** and double click on each of the points.
- Press (esc) to exit the **Coordinates and Equations** tool.



# Chapter 3 – Quadratic Relationships

Note: The following areas will not be covered in this chapter:

- Solving quadratic equations and inequalities (refer to chapter 1: Solving linear equations and inequalities)
- Solving simultaneous equations involving linear and quadratic equations (refer to chapter 1: Solving simultaneous equations).
- Solving systems of equations involving three or four unknown variables (refer to chapter 1: Solving simultaneous equations).

### Expanding factorised polynomial expressions

*Q: Expand the expression* $(2x-1)(3x^2+2x+4)$ *using a CAS calculator.*

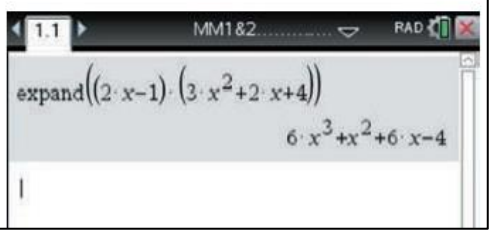
*A:*

**Using the TI-Nspire**

To expand the expression

$$(2x-1)(3x^2+2x+4)$$

use (menu) > **Algebra** > **Expand**.



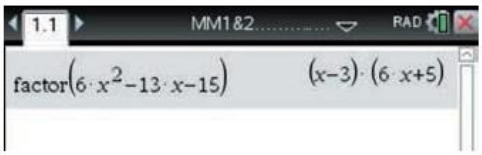

### Factorising quadratic expressions

*Q: Factorise the expression* $6x^2-13x-15$ *using a CAS calculator.*

*A:*

**Using the TI-Nspire**

To factorise the expression $6x^2-13x-15$, use (menu) > **Algebra** > **Factor**.



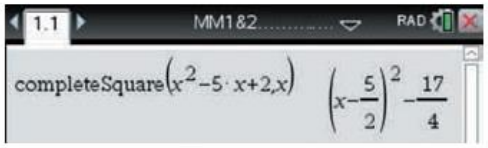

### Completing the square for a quadratic expression

*Q: Complete the square for the expression* $x^2-5x+2$*, using a CAS calculator.*

*A:*

## Using the TI-Nspire

Use (menu) > **Algebra** > **Complete the Square** to rearrange the expression $x^2 - 5x + 2$.




### Graphing quadratic equations

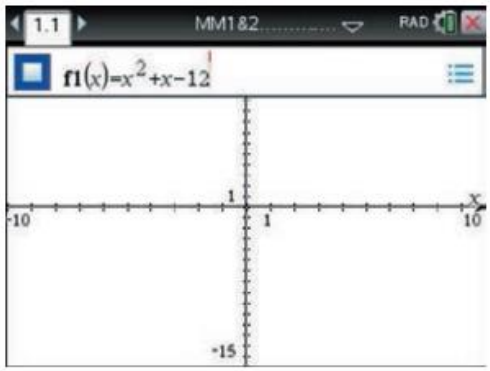
*Q: Graph the equation* $y = x^2 + x - 12$ *in a CAS calculator.*

*A:*

## Using the TI-Nspire

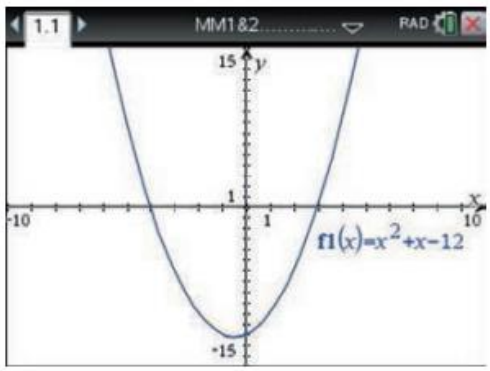
To graph the quadratic function with rule $y = x^2 + x - 12$:

- Enter the rule in the entry line of a **Graphs** application as shown, and press (enter).




- Using (menu) > **Window/Zoom** > **Window Settings**, select the window settings $-10 \le x \le 10$ and $-15 \le y \le 15$ to obtain the graph shown.

Note: You can also double click on the end values to change the window settings.



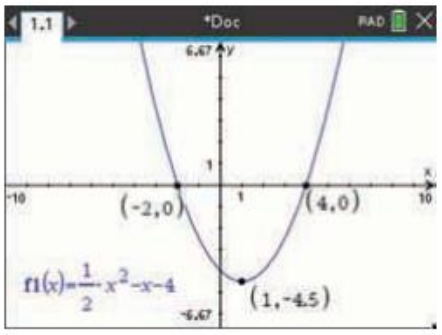

### Analysing quadratic graphs

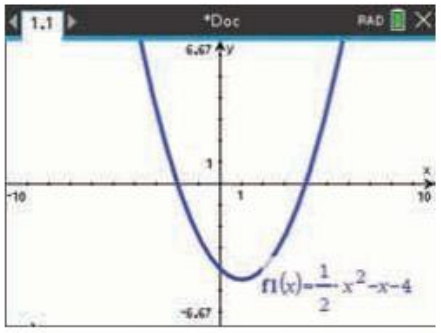
*Q: Graph the equation* $y = \frac{1}{2}x^2 - x - 4$*. Use the graph to determine the coordinates of its x-intercept(s) and turning point.*

*A:*

2. To view the key points, select:
   - MENU
   - 6. Analyze Graph
   - 1. Zero or
   - 2. Minimum or
   - 3. Maximum

   Follow the prompts to show the key points.




| TI \| THINK | DISPLAY/WRITE |
|---|---|
| 1. On a Graphs page, complete the entry line as: $f1(x) = \frac{1}{2}x^2 - x - 4$ Then press ENTER to view the graph. |  |

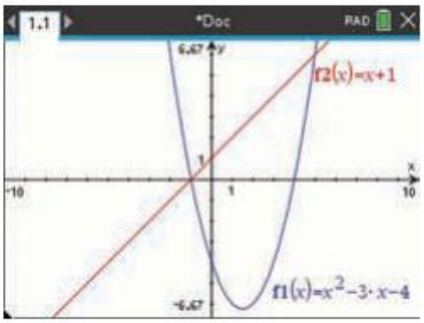


**Finding the points of intersection between a parabola and a line graphically**

*Q: Graph the equations* $y = x^2 - 3x - 4$ *and* $y = x + 1$ *and find the coordinates of their point(s) of intersection.*

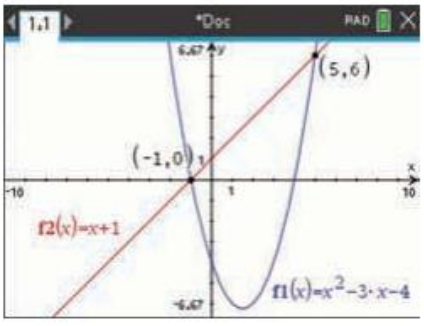
*A:*

1. On a Graphs page, complete the entry lines as:
   $f1(x) = x^2 - 3x - 4$
   $f2(x) = x + 1$
   Press ENTER after each entry to view the graphs.




2. To view the point of intersections, select:
   - MENU
   - 6. Analyze Graph.
   - 4. Intersection

   Follow the prompts to show the key points.



# Chapter 4: Cubic Polynomials; Chapter 5: Quartic Polynomials

Note: The following areas will not be covered in this chapter:

- Factorising cubic/quartic expressions (refer to chapter 3: Factorising quadratic expressions)
- Solving cubic/quartic equations and inequalities (refer to chapter 1: Solving linear equations and inequalities)
- Graphing cubic/quartic equations (refer to chapter 3: Graphing quadratic equations).

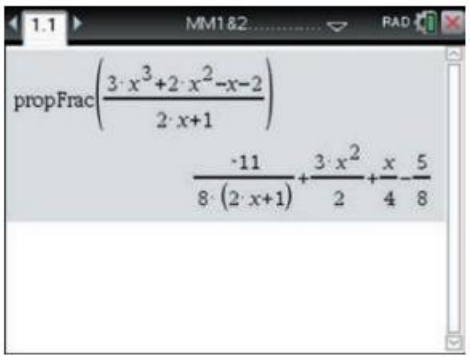
**Dividing polynomials**

*Q: Divide* $3x^3 + 2x^2 - x - 2$ *by* $2x - 1$.

*A:*

Using the TI-Nspire

Use **propFrac( )** from (menu) > **Algebra** > **Fraction Tools** > **Proper Fraction** as shown.




**Analysing cubic/quartic graphs**

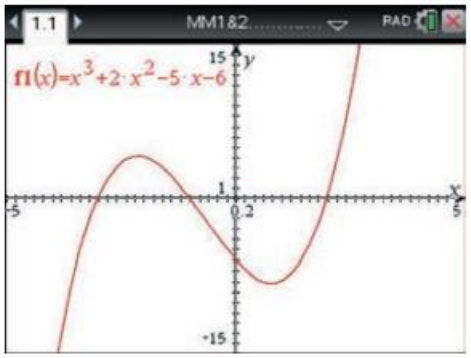
*Q: Graph the equation* $y = x^3 + 2x^2 - 5x - 6$*. Use the graph to determine the coordinates of its maximum and minimum turning points.*

*A:*

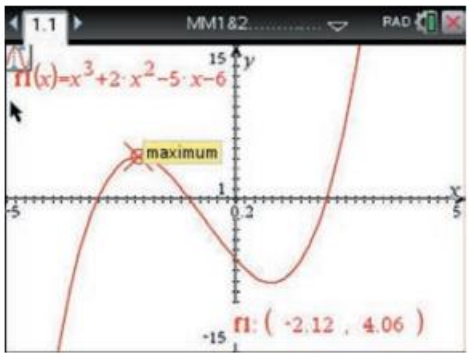
Using the TI-Nspire

In order to provide more detail, the coordinates of the turning points can be found with a CAS calculator.

- Enter $f_1(x) = x^3 + 2x^2 - 5x - 6$ in a **Graphs** application.
- Choose a suitable window ( (menu) > **Window/Zoom** > **Window Settings**).



- Use (menu) > **Analyze Graph** > **Maximum**.
- Move cursor to the left of point (lower bound), click, move to the right of point (upper bound) and click to display the coordinates.
- Repeat for other points of interest.



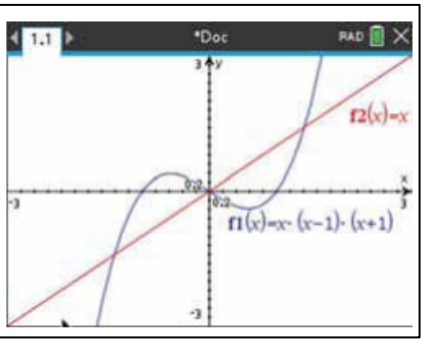

Note: Alternatively, use (menu) > **Trace** > **Graph Trace** to find the coordinates of the two turning points. A label will appear near a turning point to indicate that the calculator has found a local maximum or a local minimum.

## Finding the points of intersection between a cubic graph and a line graphically

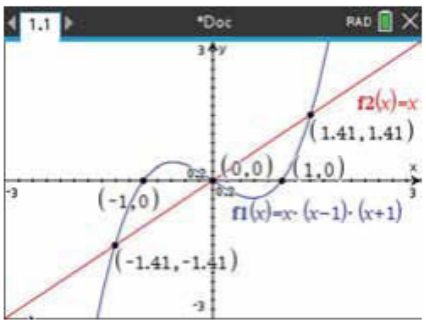
*Q: Graph the equations $y = x(x-1)(x+1)$ and $y = x$ and find the coordinates of their points of intersection (exact values are not required).*

*A:*

1. On a Graphs page, complete the entry line for function 1 as:
$f1(x) = x \cdot (x-1) \cdot (x+1)$
and the entry line for function 2 as:
$f2(x) = x$
then press ENTER.




3. To find the points of intersection, press MENU, then select:
6: Analyze Graph
4: Intersection
Move the cursor to the left of the point of intersection when prompted for the lower bound and press ENTER.
Move the cursor to the right of the point of intersection when prompted for the upper bound and press ENTER.
Repeat this process to find the other points of intersection.



# Chapter 6: Functions and relations

Note: The following areas will not be covered in this chapter:

- Solving equations and inequalities of the form $\frac{1}{x} = a$, $\frac{1}{x^2} = a$, $\sqrt{x} = a$ (refer to chapter 1: Solving linear equations)
- Graphing equations of the form $y = \frac{1}{x}$, $y = \frac{1}{x^2}$, and $y = \sqrt{x}$ (refer to chapter 3: Graphing quadratic equations).

### Defining functions and solving equations in terms of functions

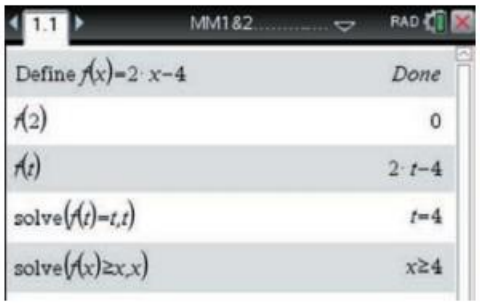
*Q: Let $f(x) = 2x - 4$. Find the values of $f(2)$ and $f(t)$. Solve the equation $f(t) = t$ and the inequality $f(x) \geq x$.*

*A:*

**Using the TI-Nspire**

- Use (menu) > **Actions** > **Define** to define the function $f(x) = 2x - 4$. Find $f(2)$ and $f(t)$.
- Use (menu) > **Algebra** > **Solve** to solve the equation $f(t) = t$ and the inequality $f(x) \geq x$.

Note: The symbol ≥ can be accessed from the symbols palette (ctrl)(menu) or by using (ctrl)(=) and selecting ≥.




### Restricting functions

*Q: Define the function $f: [-1, 1] \to \mathbb{R}, f(x) = x^2 + x$. Find the values of $x$ for which the minimum and the maximum values of $f$ occur. Then, show the minimum and maximum of $f$ graphically.*

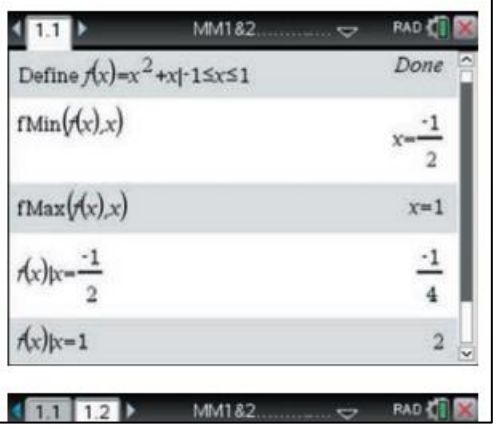
*A:*

**Using the TI-Nspire**

- In a **Calculator** application, use (menu) > **Actions** > **Define** to define the function $f: [-1, 1] \to \mathbb{R}, f(x) = x^2 + x$.

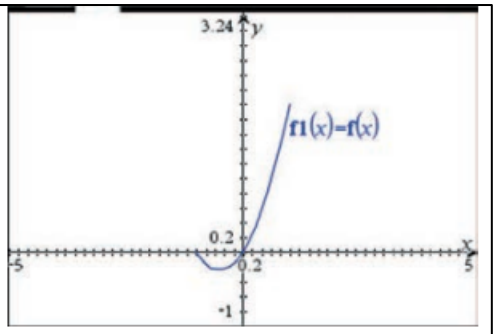
Note: The 'with' symbol | and the inequality signs can be accessed using (ctrl)(=).

- Use (menu) > **Calculus** > **Function Minimum** and (menu) > **Calculus** > **Function Maximum** to help determine the range of this restricted function. The range is $[-\frac{1}{4}, 2]$.



- The graph of $y = f(x)$ is plotted by entering $f_1(x) = f(x)$ in a **Graphs** application.
- Use menu > **Analyze Graph** > **Minimum or Maximum** to show the key points.

Note: You can also enter the restricted function directly in the function entry line in the **Graphs** application if preferred.



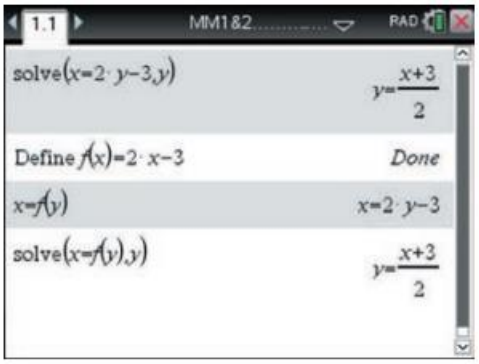

**Finding the inverse function of a function**

*Q: Find the inverse function $f^{-1}$ of the function $f(x) = 2x - 3$.*

*A:*

Using the TI-Nspire

To find the inverse of the function with rule $f(x) = 2x - 3$, use menu > **Algebra** > **Solve**. Two methods are shown.



# Chapter 8: Trigonometric Functions; Chapter 9: Trigonometric Functions and Applications

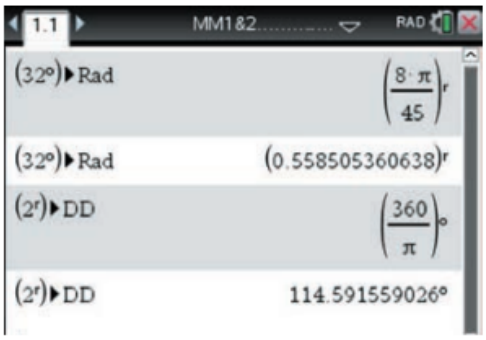
**Converting angles between radians and degrees**

*Q: Convert* $32°$ *to radians and 2 radians to degrees.*

*A:*

## Using the TI-Nspire

To convert 32 degrees to radians, type $32°$ ▸ **Rad** as shown.




- The degree symbol ° is found in the symbols palette (ctrl 🕮) or the catalog (🕮 4).
- The ▸ **Rad** command can be found in the catalog (🕮 1 R).

To convert 2 radians to degrees, type $2^r$ ▸ **DD** as shown.

- The radian symbol ʳ is found in the symbols palette (ctrl 🕮) or the catalog (🕮 4).
- The ▸ **DD** command can be found in the catalog (🕮 1 D).

Note: If the calculator is in radian mode, you can convert 32° to radians by simply typing 32° then enter. If the calculator is in degree mode, type $2^r$ then enter.

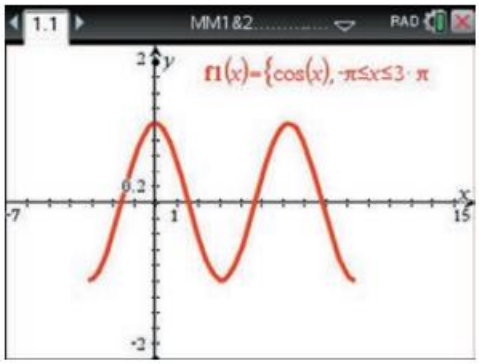
**Graphing sine, cosine and tangent functions**

*Q: Graph the function* $y = cosx$ *for* $-\pi \leq x \leq 3\pi$.

*A:*

## Using the TI-Nspire

- A graph of $y = \cos x$ for $-\pi \leq x \leq 3\pi$ can be plotted in a **Graphs** application by entering $f_1(x) = \cos(x) \mid -\pi \leq x \leq 3\pi$.
- Change the window to suit (menu > **Window/Zoom** > **Window Settings**).



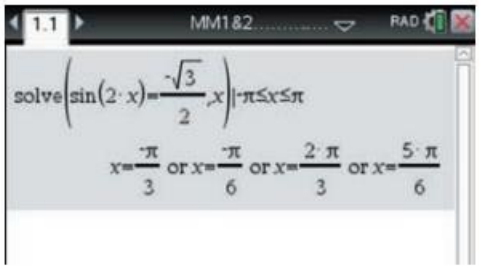

**Finding a set of solutions to a trigonometric equation with a restricted domain**

*Q: Solve the equation* $\sin(3x) = \frac{-\sqrt{3}}{2}$, *for* $-\pi \leq x \leq \pi$.

*A:*

## Using the TI-Nspire

Ensure that the calculator is in radian mode and complete as shown.




**Finding the general solution(s) to a trigonometric equation**

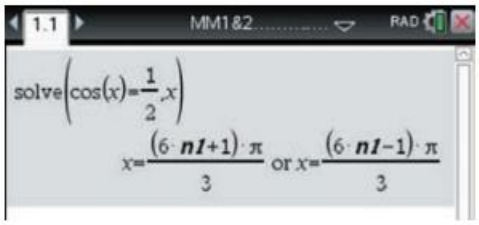
*Q: Find the general solution(s) to each of the following equations:* $\cos(x) = \frac{1}{2}$, $\sqrt{3}\tan(3x) = 1, \sqrt{2}\sin(x) = 1.$

*A:*

## Using the TI-Nspire

Check that the calculator is in radian mode.

a Use (menu) > **Algebra** > **Solve** and complete as shown. Note the use of $\frac{1}{2}$ rather than 0.5 to ensure that the answer is exact.

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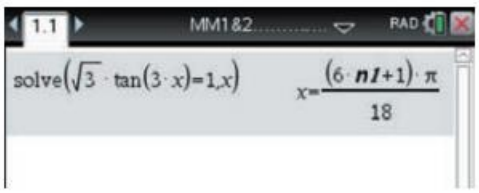


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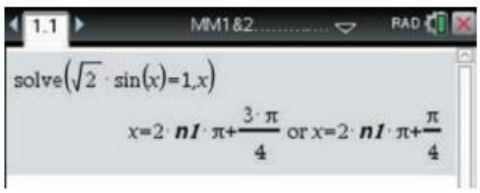


# Chapter 10: Exponential Functions and Logarithms

Note: The following areas will not be covered in this chapter:

- Solving exponential and logarithmic equations and inequalities (refer to chapter 1: Solving linear equations and inequalities)
- Graphing exponential and logarithmic equations (refer to chapter 2: Graphing quadratic equations).

**Finding the point of intersection between an exponential or a logarithmic graph and a line**

*Q: Plot the graph of* $y = 2^x$ *and hence find the value of* $y$ *when* $x = 2.1$*, and the value of* $x$ *when* $y = 9$*.*

*A:*

## Using the TI-Nspire

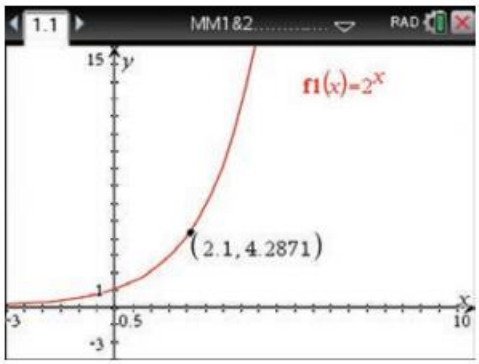
Plot the graph of $y = 2^x$.

**a** ■ To go to the point with $x$-coordinate 2.1, use (menu) > **Trace** > **Graph Trace** and type 2.1 (enter).

■ Press (enter) to paste the coordinates to the point.

■ Press (esc) to exit the **Graph Trace** tool.

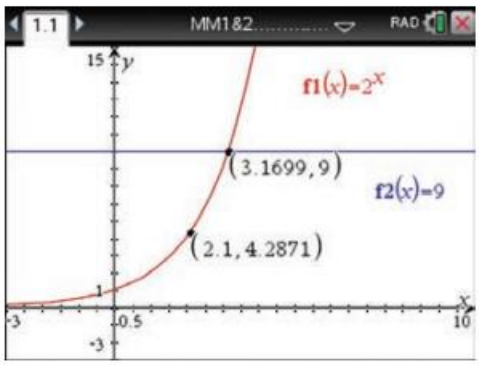
When $x = 2.1$, $y = 4.287$ (correct to three decimal places).




**b** ■ To find the value of $x$ for which $y = 9$, plot the graph of $y = 9$ on the same screen and use (menu) > **Geometry** > **Points & Lines** > **Intersection Point(s)**.

■ Press (esc) to exit the **Intersection Point(s)** tool.

When $y = 9$, $x = 3.170$ (correct to three decimal places).




Note: Alternatively, find the intersection point using (menu) > **Analyze Graph** > **Intersection**.

# Chapter 11 – Introduction to Differential Calculus: Chapter 12 – Differentiation and Applications

**Finding the average rate of change of a polynomial function over a certain domain**

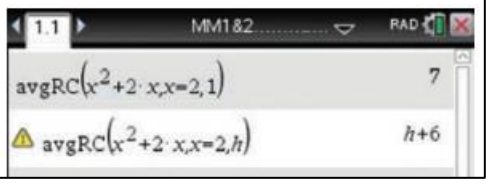
*Q: For the function* $f(x) = x^2 + 2x$*, find the average rate of change for* $x \in [2, 3]$ *and* $x \in [2, 2 + h]$.

*A:*

**Using the TI-Nspire**

- For parts a and b, use the catalog to access the **Average Rate of Change** command ( 1 A ) and enter as:

  avgRC(*expression*, *x* = *initial value*, *step size*)



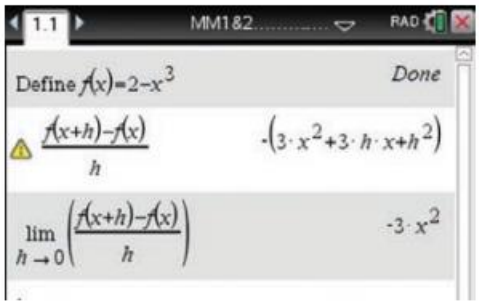

**Finding the derivative of a polynomial function by the limit definition (first principles)**

*Q: For* $f(x) = 2 - x^3$*, find* $f'(x)$ *by first principles.*

*A:*

**Using the TI-Nspire**

- Define $f(x) = 2 - x^3$.
- Use (menu) > **Calculus** > **Limit** or the 2D-template palette, and complete as shown.




**Finding the derivative of a polynomial function**

*Q: Differentiate* $x^5 - 2x^3 + 2$ *with respect to* $x$.

*A:*

For Example 7:

- Use (menu) > **Calculus** > **Derivative** and complete as shown.


Note: The derivative template can also be accessed from the 2D-template palette. Alternatively, using (shift) (–) will paste the derivative template to the screen.

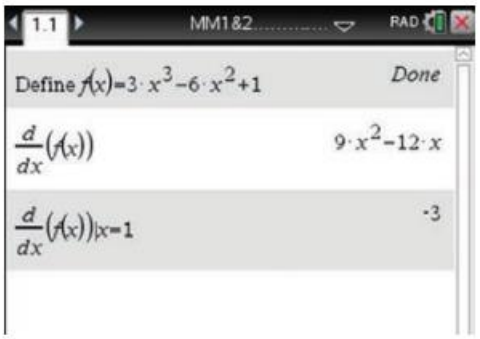
**Finding the value of the derivative of a polynomial function at a certain point**

*Q: For* $f(x) = 3x^3 - 6x^2 + 1$*, find* $f'(1)$*.*

*A:*

For Example 8:

- Define $f(x) = 3x^3 - 6x^2 + 1$.
- Use (menu) > **Calculus** > **Derivative** to differentiate as shown.
- To find the value of the derivative at $x = 1$, use (menu) > **Calculus** > **Derivative at a Point**.



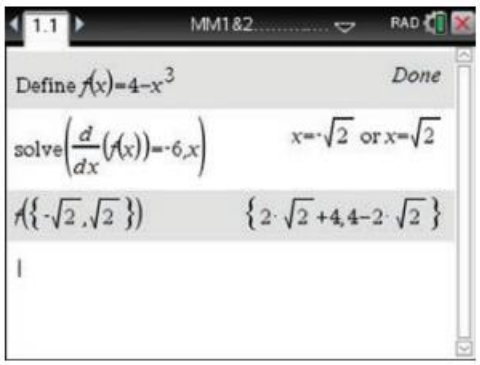

**Solving equations involving the derivative of a polynomial function**

*Q: For the curve* $y = 4 - x^3$*, find the value of* $y$ *at the point where the gradient of the tangent line is* $-6$*.*

*A:*

Using the TI-Nspire

- Define $f(x) = 4 - x^3$.
- Solve the equation $\frac{d}{dx}(f(x)) = -6$.
- Substitute in $f(x)$ to find the $y$-coordinates.

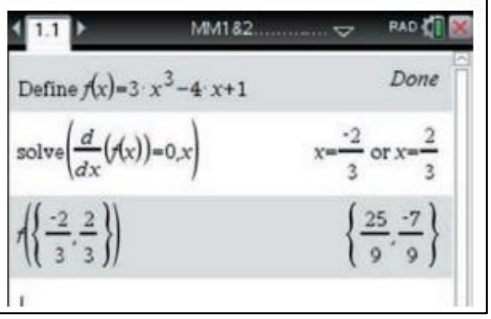



*Q: For the function* $f(x) = 3x^3 - 4x + 1$*, find the coordinates of the stationary points.*

*A:*

Using the TI-Nspire

- Define the function $f(x) = 3x^3 - 4x + 1$.
- Use (menu) > **Algebra** > **Solve** and (menu) > **Calculus** > **Derivative** to solve the equation $\frac{d}{dx}(f(x)) = 0$ and determine the coordinates of the stationary points.

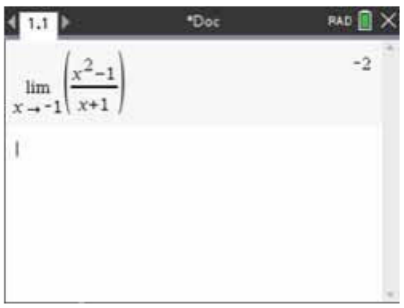


**Finding the limit of a polynomial function or a set of piecewise-defined polynomial functions**

*Q: Find* $\lim_{x\to -1}\left(\frac{x^2-1}{x+1}\right)$.

*A:*

1. On a Calculator page, press MENU and select:
   4. Calculus
   4. Limit
   Complete the entry line as:
   $\lim_{x\to -1}\left(\frac{x^2-1}{x+1}\right)$
   Then press ENTER.

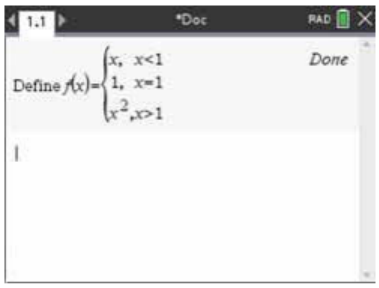



*Q: For the function below, find* $\lim_{x\to 1} f(x)$.

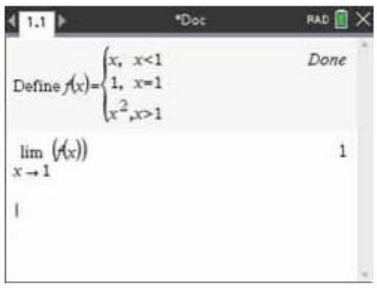
$$f(x)=\begin{cases} x, & x<1 \\ 1, & x=1 \\ x^2, & x>1 \end{cases}$$

*A:*

1. On a Calculator page, press MENU and select:
   1. Actions
   1. Define
   Complete the entry line as:
   Define $f(x)=\begin{cases} x, & x<1 \\ 1, & x=1 \\ x^2, & x>1 \end{cases}$
   Then press ENTER.
   *Note:* The piecewise function template is available by pressing the button, then




2. Press MENU and select:
   4: Calculus
   4: Limit
   Complete the entry line as:
   $\lim_{x\to 1}(f(x))$
   Then press ENTER.



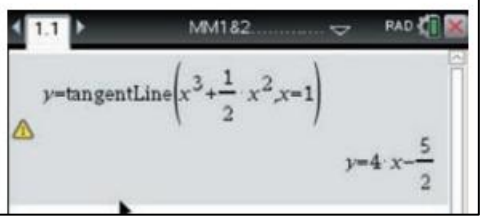
**Finding the equation of the tangent or normal line to a polynomial graph at a certain point**

*Q: Find the equation of the tangent to the curve* $y = x^3 + \frac{1}{2}x^2$ *at the point* $x = 1$.

*A:*

Using the TI-Nspire

Use (menu) > **Calculus** > **Tangent Line** to calculate the tangent to the curve at $x = 1$.

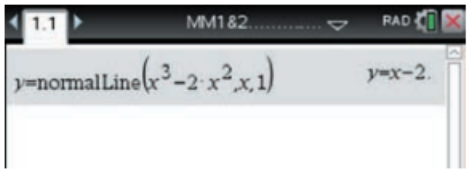



*Q: Find the equation of the normal to the curve* $y = x^3 - 2x^2$ *at the point* $(1, -1)$.

*A:*

Using the TI-Nspire

Use (menu) > **Calculus** > **Normal Line** to calculate the normal to the curve at the point $(1, -1)$, i.e. when $x = 1$.



# Chapter 13: Anti-differentiation and Introduction to Differential Calculus

**Finding the antiderivative of a polynomial function**

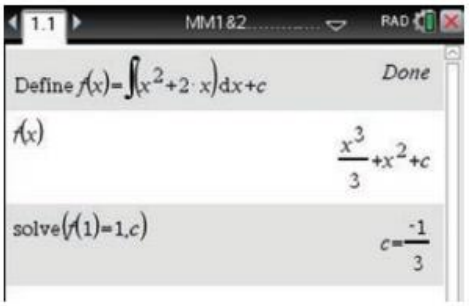
*Q: Find* $f(x)$ *if* $f'(x) = x^2 + 2x$ *and* $f(1) = 1$.

*A:*

**Using the TI-Nspire**

For Example 27a:

- To find the general antiderivative, define the function $f(x)$ using (menu) > **Calculus** > **Integral** as shown.
- Check that $c$ has not been assigned a value.
- For the specific antiderivative, find the value of $c$ by solving $f(1) = 1$.




**Finding the definite integral of a polynomial function**

*Q: Find the value of* $\int_{-1}^{2}(3x^2 + 1)\,dx$.

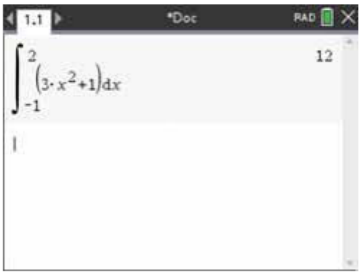
*A:*

1. On a Calculator page, press MENU and select:
   4. Calculus
   3. Integral

   Complete the entry line as:

$$\int_{-1}^{2}(3x^2 + 1)\,dx$$

   Then press ENTER.



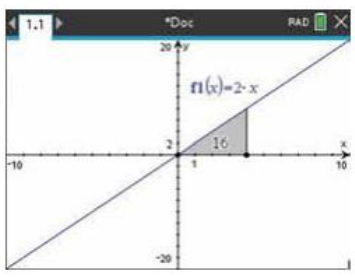

**Finding the area under a graph of a polynomial function graphically**

*Q: Find the area bounded by the line* $y = 2x$, *the x-axis and the lines* $x = 0, x = 4$.

*A:*

1. On a Graphs page, complete the entry line as:
   $f1(x) = 2x$.
   Then press ENTER.
   Then press MENU and select:
   6. Analyze Graph
   7. Integral

   Place the lower bound at $x = 0$ and the upper bound at $x = 4$.
   Then press ENTER.



# Summary of essential skills

| Topic chapter | By the end of this chapter, you should be able to do the following using a CAS calculator: |
|---|---|
| 1: Lines and Linear Relationships | • Solve linear equations and inequalities<br>• Solve simultaneous equations involving two unknown variables<br>• Graph linear equations |
| 3: Quadratic Relationships | • Expand factorised polynomial expressions<br>• Factorise quadratic expressions<br>• Complete the square for a quadratic expression<br>• Solve quadratic equations and inequalities<br>• Solve simultaneous equations involving linear and quadratic equations<br>• Solve systems of equations involving three or four unknown variables<br>• Graph quadratic equations<br>• Analyse quadratic graphs<br>• Find the points of intersection between a parabola and a line graphically |
| 4: Cubic Polynomials. 5: Quartic Polynomials | • Divide polynomials<br>• Factorise cubic/quartic expressions<br>• Solve cubic/quartic equations and inequalities<br>• Graph cubic/quartic equations<br>• Find the points of intersection between a cubic graph and a line graphically |
| 6: Functions and Relations | • Graph equations of the form $y = \frac{1}{x}, y = \frac{1}{x^2}$ and $y = \sqrt{x}$.<br>• Define functions and solve equations in terms of functions<br>• Restrict functions<br>• Find the inverse function of a function |
| 7: Probability | • Calculate expressions and solve equations involving the use of factorials |
| 8: Trigonometric Functions, 9: Trigonometric Functions and Applications | • Convert angles between radians and degrees<br>• Graph sine, cosine and tangent functions<br>• Find a set of solutions to a trigonometric equation with a restricted domain<br>• Find the general solution(s) to a trigonometric equation |
| 10: Exponential Functions and Logarithms | • Solve exponential and logarithmic equations and inequalities<br>• Graph exponential and logarithmic equations<br>• Find the point of intersection between an exponential or a logarithmic graph and a line |
| 11: Introduction to Differential Calculus, 12: Differentiation and Calculus | • Find the average rate of change of a polynomial function over a certain domain<br>• Find the derivative of a polynomial function<br>• Find the value of the derivative of a polynomial function at a certain point<br>• Solve equations involving the derivative of a polynomial function<br>• Find the limit of a polynomial function or a set of piecewise-defined polynomial functions<br>• Find the equations of the tangent or normal line to a polynomial graph at a certain point |
| 13: Anti-differentiation and Introduction to Differential Calculus | • Find the antiderivative of a polynomial function<br>• Find the definite integral of a polynomial function<br>• Find the area under a graph of a polynomial function graphically |
| Algorithms and Pseudocode* | • Programme codes |

**CAS calculator tutorials for the Algorithms and Pseudocode chapter are not included in this document. Refer to the Jacaranda textbook for details.*

# Appendix: List of useful TI-Nspire CAS calculator shortcuts

| Shortcut | Function |
|---|---|
| Ctrl + A | Select all |
| Ctrl + C | Copy |
| Ctrl + H | Find and replace |
| Ctrl + K | Select page (in split screen) |
| Ctrl + N | New document |
| Ctrl + O | Open document |
| Ctrl + R | Recalculate |
| Ctrl + S | Save document |
| Ctrl + V | Paste |
| Ctrl + W | Close current document |
| Ctrl + X | Cut |
| Ctrl + Y | Redo |
| Ctrl + Z | Undo |
| Ctrl + 1 | Move to end of list/page down |
| Ctrl + 3 | Page down |
| Ctrl + 4 | Merge two pages into split screen |
| Ctrl + 7 | Move to top of list/page up |
| Ctrl + 6 | Convert split screen into two pages |
| Ctrl + 9 | Page up |
| Ctrl + space | Underscore |
| Ctrl + tab | Toggle between split screen windows |
| Ctrl + tab | Toggle between open documents |
| Shift + (-) | Derivative |
| Shift + + | Integral |
| Shift + arrows | Highlight selected text |
| Shift + esc | Redo |