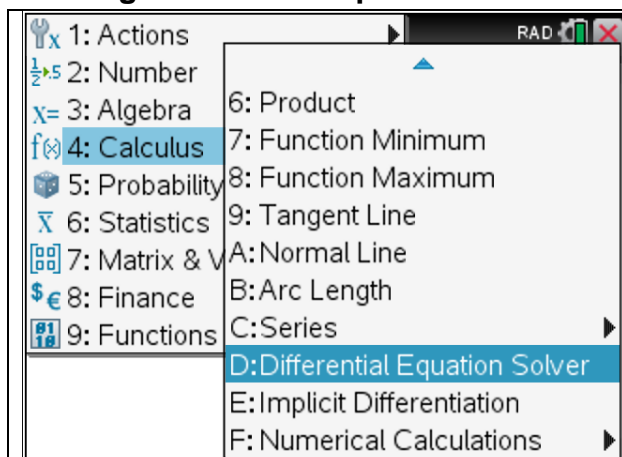
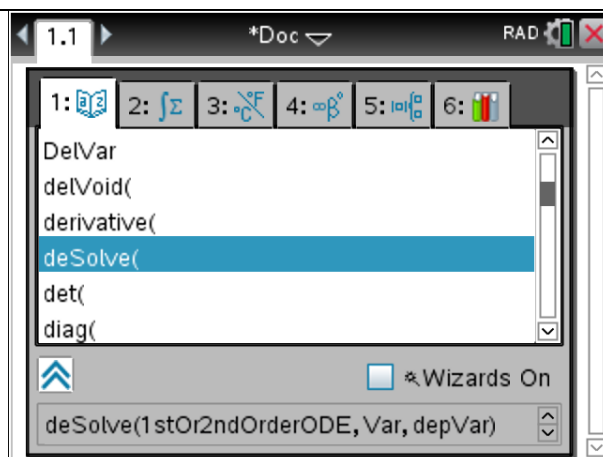


Differential Equations and Implicit Differentiation

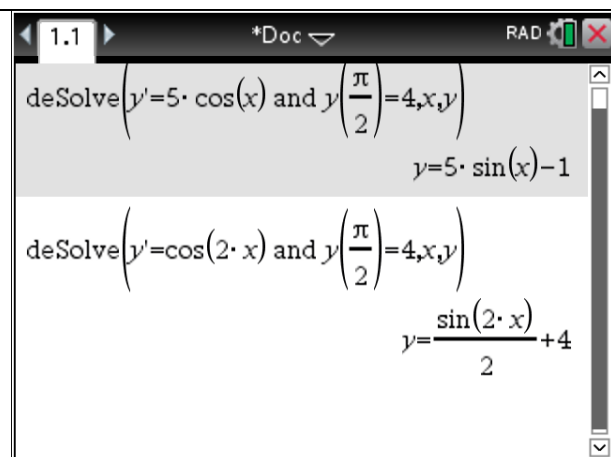
Solving Differential Equations



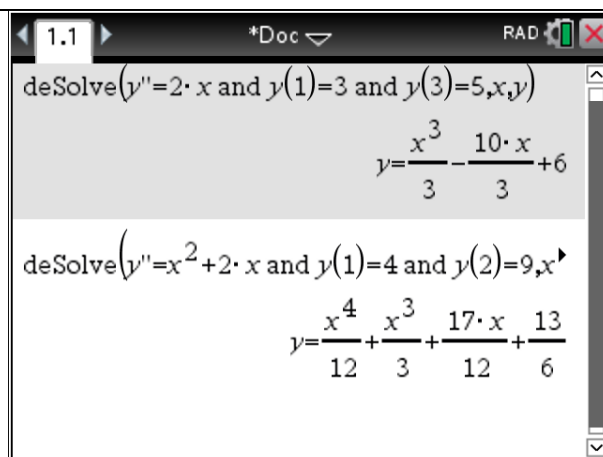
Press **menu > Calculus > Differential Equation Solver**.



Alternatively, press the **catalog** key, then **D** and scroll down to the **deSolve(** function. Note the function parameters at the bottom of the screen.



These are examples of solutions to first order differential equations. Use **y'** to indicate the first order DE.



These are examples of solutions to second order differential equations. Use **y''** (two single dashes) to indicate a second order DE.

1. Verify that $y = e^{2x} - e^{-2x}$ is a solution to the differential equation $\frac{d^2 y}{dx^2} = 4y$.

2. Match the solution to each of the following differential equations

(A) $\frac{dy}{dx} = \frac{x}{y-1}$

(1) $y = 1 + x^2$

(B) $\frac{dy}{dx} = \frac{y(1+x)}{x}$

(2) $y = \frac{x}{1-x}$

(C) $\frac{dy}{dx} = \frac{y(1+y)}{x}$

(3) $y = 1 + \sqrt{1+x^2}$

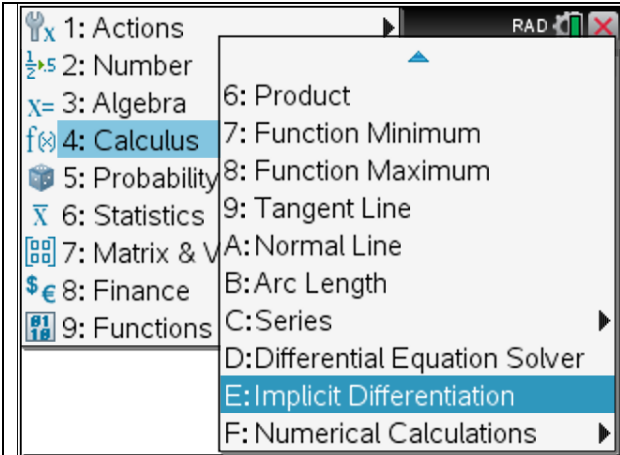
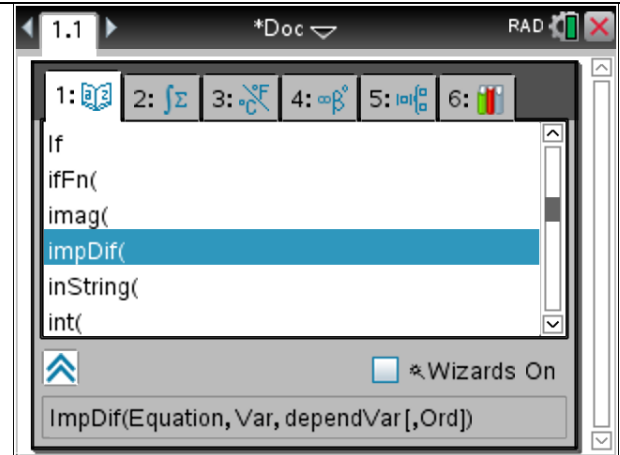
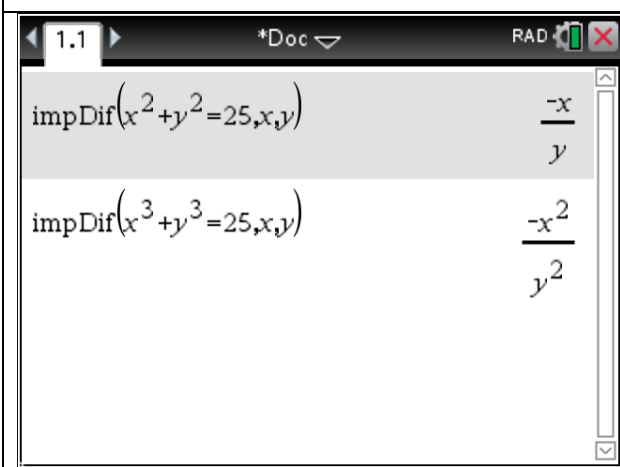
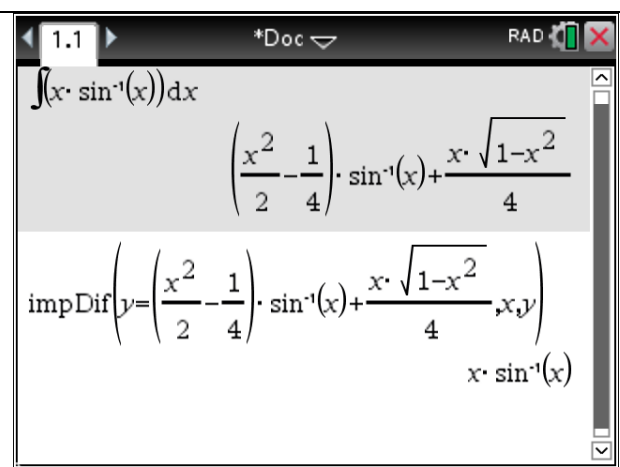
(D) $\frac{dy}{dx} = 2\sqrt{y-1}$

(4) $y = xe^x$

(E) $\frac{dy}{dx} = -\sqrt{1-y^2}$

(5) $y = \cos(x-1)$

Implicit Differentiation

| | | | |
|---|--|---|--|
|  <p>1: Actions 2: Number 3: Algebra 4: Calculus 5: Probability 6: Statistics 7: Matrix & V 8: Finance 9: Functions</p> <p>6: Product 7: Function Minimum 8: Function Maximum 9: Tangent Line A: Normal Line B: Arc Length C: Series D: Differential Equation Solver E: Implicit Differentiation F: Numerical Calculations</p> |  <p>1.1 *Doc RAD</p> <p>1: 2: 3: 4: 5: 6:</p> <p>If ifFn(imag(impDif(inString(int(Wizards On ImpDif(Equation, Var, dependVar [, Ord])</p> | <p>Press menu > Calculus > Implicit Differentiation.</p> | <p>Alternatively, press the catalog key, then I and scroll down to the ImpDif function. Note the function parameters at the bottom of the screen.</p> |
|  <p>1.1 *Doc RAD</p> <p>impDif($x^2 + y^2 = 25, x, y$) $\frac{-x}{y}$</p> <p>impDif($x^3 + y^3 = 25, x, y$) $\frac{-x^2}{y^2}$</p> |  <p>1.1 *Doc RAD</p> <p>$\int (x \cdot \sin^{-1}(x)) dx$</p> <p>$\left(\frac{x^2}{2} - \frac{1}{4}\right) \cdot \sin^{-1}(x) + \frac{x \cdot \sqrt{1-x^2}}{4}$</p> <p>impDif($y = \left(\frac{x^2}{2} - \frac{1}{4}\right) \cdot \sin^{-1}(x) + \frac{x \cdot \sqrt{1-x^2}}{4}, x, y$) $x \cdot \sin^{-1}(x)$</p> | <p>Input an equation followed by the variables separated by commas.</p> | <p>Implicit differentiation can be used to find the derivative of functions that are too difficult for the derivative function.</p> |