

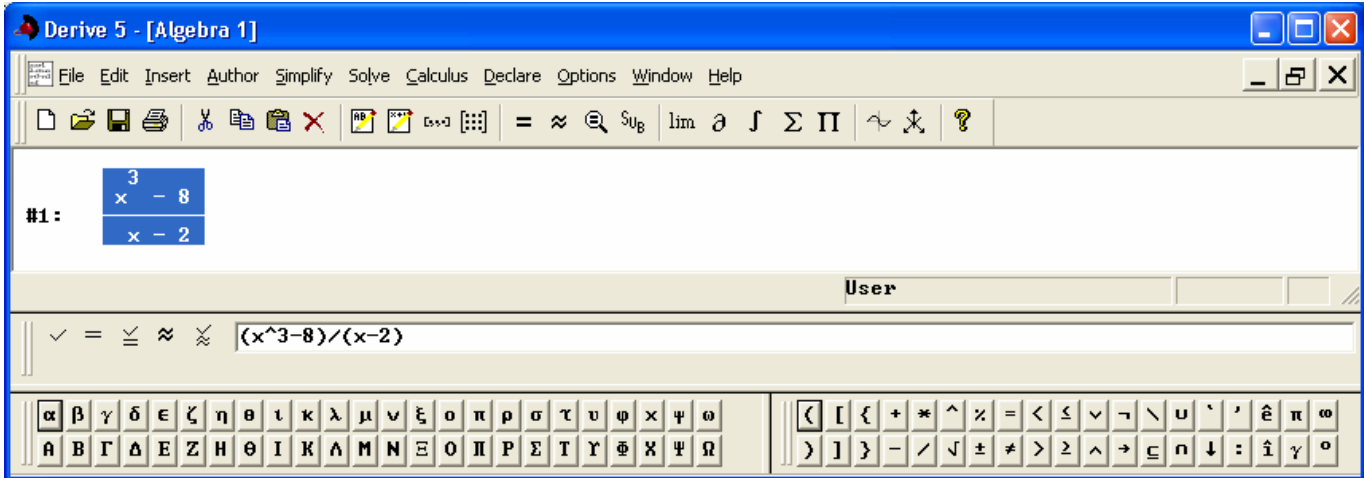


DERIVE 5.06 - Prof. Richard B. Goldstein

BOOT-UP PROCEDURE

Press the **Start** button: , then **All Programs**  and under Mathematical Software locate  **Derive 5** and you will see the screen:

SCREEN



Icons: (as shown in groups from left to right)

New | Open | Save | Print
 Cut | Copy | Paste | Remove
 Insert Text | Author expression | Author vector | Author matrix
 Simplify | Approximate | Solve | Substitute for variables
 Calculate: limit | derivative | integral | sum | product
 2D - plot window [Ctrl + 2] | 3D - plot window [Ctrl + 3] | Help

Alternatively, one can use the **pull-down menu**.

File

New... (Ctrl+N)
Open... (Ctrl+O)
Close
Save (Ctrl+S)
 Save As...
Load
Write To
Page Setup...
Print Preview
Print... (Ctrl+P)
 Recent Worksheets..
Exit

Edit

Derive Object
Annotation...
Link to OLE Object...
Object
Delete (Del)
Undelete (Ctrl+Z)
Select All (Ctrl+A)
Cut (Ctrl+X)
Copy (Ctrl+C)
Paste (Ctrl+V)
Mark and Copy... (Ctrl+Shift+M)

Insert

2D-plot Object... (Ctrl+2)
3D-plot Object... (Ctrl+3)
Text Object F5
OLE Object

Author

Expression... F2
Vector...
Matrix...

Simplify

Basic... (Ctrl+B)
Expand... (Ctrl+E)
Factor... (Ctrl+F)
Approximate... (Ctrl+G)
Variable Subst. (Ctrl+W)
Subexpress. Sub. (Ctrl+T)

Solve

Expression (Ctrl+Shift+E)
System... (Ctrl+shift+S)

Calculus

Limit...
Differentiate...
Taylor Series...
Integrate...
Sum...
Product...
Table

Declare

Variable Value...
Variable Domain...
Function Definition...
Input Settings
Output Settings
Simplification Settings
Reset All Settings

Options

Display
Printing
Startup
Renumber Expressions
Hide Label
Hide Plots
Hide Text
Hide OLE Object

Window

Cascade
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ENTERING EXPRESSIONS - Choose **Author** | **Expression** or **F2** or just type in text box at bottom

Algebraic Expression	DERIVE form
$x^3 - 6x^2 + 9$	$x^3 - 6x^2 + 9$
$\frac{e^{x^2}}{\sqrt{2x+1}}$	$\exp(x^2)/\sqrt{2x+1}$
$\frac{d^2}{dx^2} \int_0^x t^3 e^{-t} dt$	$\text{dif}(\text{int}(t^3 \# e^{(-t)}, t, 0, x), x, 2)$

Note: for text such as your name simply enter the text within quotes - for example: "AJames Smith"

REMOVING EXPRESSIONS

One can highlight the expressions to erase and press the **Delete** key or the **Remove icon**.

PRINTING

From any Window - Algebraic, 2D-plot, or 3D-Plot type **Ctrl + P** or use the **print icon** or the pull-down menu **File | Print**.

SAVE

You can save your work by **Ctrl + S** or use the **save icon** or by the pull-down menu **File | Save**. Also there is a **Save As** option in the pull-down menu.

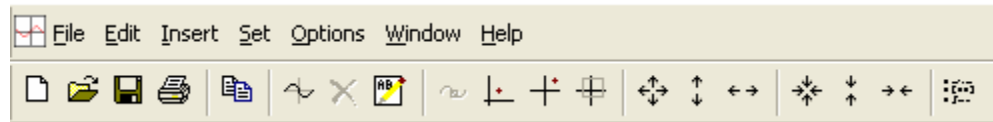
OPEN

This allows the user to open previously saved files.

LOAD

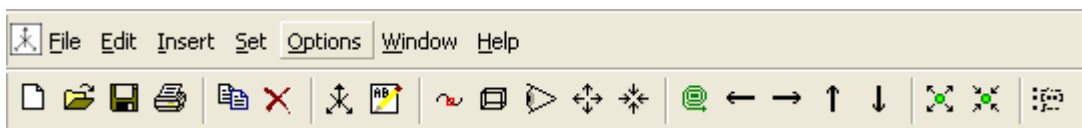
This option allows the user to load **Math**, **Data**, **Demo**, or **Utility** files. There are many useful utility files to load as **Dif_apps.mth**, **Int_apps.mth**, **Ode1.mth**, **Orth_pol.mth**, and **Plotpara.mth**. Once loaded there are additional built-in calculations that these provide.

2D PLOT SCREEN



Either highlight an algebraic expression that has already been entered or enter an expression by F2. Press the 2D - plot window icon or type **Ctrl + 2**. Once in the 2D - plot Window press the **plot icon** or use the pull-down menu. You can change colors, size, view, add additional graphs, recenter, rescale, etc.

3D PLOT SCREEN



Similar to 2D for functions of two variables. For example, you might try x^2+y^2 . You may move the eye position, rotate the graph in an animation, etc.

EXIT

To exit use the pull-down menu **File | Exit**

SAMPLE ACTIVITIES:

CALCULUS: Let $f(x) = \frac{2x^2 - 5x + 2}{x^2 - 6x + 8}$ Enter: $(2x^2-5x+2)/(x^2-6x+8)$

Calculate: $\lim_{x \rightarrow 2} f(x)$, $\lim_{x \rightarrow \infty} f(x)$, $f'(x)$, $\int f(x) dx$, $\int_5^7 f(x) dx$

- Press the **[lim]** button (limit icon), let the variable be x , the limit point be **2**, from both sides and press **Simplify**. The answer is **- 3/2**
- Highlight the expression again, press the **[lim]** button, and use for the second limit point enter either: **inf** or the **4** as chosen from the character set in the dialog box. Press **Simplify** – the answer is **2**.
- The expression is highlighted again and the **[M]** button (derivative icon) is chosen. The order is **1**. Press **Simplify** – the answer is **- 7 / (x - 4)²**
- After the expression is highlighted press the **[I]** button (integral icon). This is an indefinite integral. Press **Simplify** - the answer is **7LN(x - 4) + 2x**
- Finally, highlight the expression one more time and press the **[I]** button. We have a **definite integral** with lower limit of **5** and upper limit to **7**. Press **Simplify** – the answer is **7LN(3)+4**.
- You may wish to graph one or more of these answers along with the original expression.

LINEAR ALGEBRA

Let $\mathbf{a} = [2, -1, 6]$ and $\mathbf{b} = [4, 2, 2]$ Find $\mathbf{a} \bullet \mathbf{b}$ and $\mathbf{a} \times \mathbf{b}$

- There are choices here again. Either enter the expressions using **F2** and type **a:=[2,-1,6]** and then repeat with **b:=[4,2,2]** or use the **Author vector icon** shown as **[XXX]**. Here the expression will be simply known as #1 and #2 say for example.
- To get the dot (inner) product, author the expression **a.b** or **#1.#2** Press the Simplify icon [=]. The result is **18**.
- To get the cross product, author the expression **cross(a,b)** or **cross(#1,#2)**. The result is: **[-14, 20, 8]**.

DIFFERENTIAL EQUATIONS

(1) Solve: $y' + 3x^2 y = 6x^2$, $y(0) = 5$

This is a linear ordinary differential equation of form: $y' + p(x)y = q(x)$, $y(x_0) = y_0$

The utility expression in DERIVE is linear1(p, q, x, y, x₀, y₀)

- Load the file **Ode1.mth** from the Math folder by **File | Load | Utility**
- Enter the expression: `linear1(3x^2,6x^2,x,y,0,5)`
- After pressing the icon [=] the result is shown as $y = 3\hat{e}^{-x^3} + 2$

(2) Find the Taylor Series solution of $y' = x^2 y$, $y(0) = 2$

This is an equation of the form: $y' = r(x, y)$, $y(x_0) = y_0$

The utility expression is TAYLOR_ODE1(r, x, y, x₀, y₀, n)

- Load the file **Ode_appr.mth** from the Math folder.
- Enter the expression: `taylor_ode1(x^2y,x,y,0,2,6)`
- The result is $\frac{x^6}{9} + \frac{2x^3}{3} + 2$