

Universidad Nacional del Callao



Lenin Araujo Castillo

physicsleninac@hotmail.com

Análisis Vectorial Para Ingeniería: Usando
Maplesoft en Maplecloud

Lima - Perú

III Coloquio Regional de Física - 2015



CONTENIDO

- Introducción a MapleCloud
- Análisis Vectorial en MapleCloud
- Funcionamiento
- Algunos Casos en Maple 2015
- Algunas conclusiones



Maplesoft
Engineering
Solutions

III Coloquio Regional de Física - 2015

1



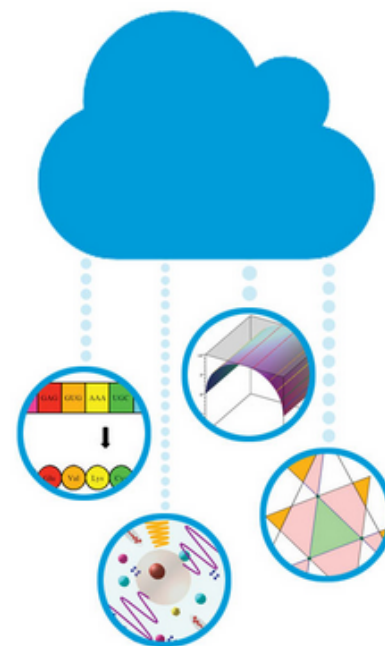
[What's New?](#) [Features](#) [Online Demos](#) [Compare](#) [Training](#) [Community](#) [Evaluate](#) [Buy Maple](#)

[Home](#) : [Maplesoft Products](#) : [Maple](#) : [Maple Features](#) : MapleCloud

MapleCloud

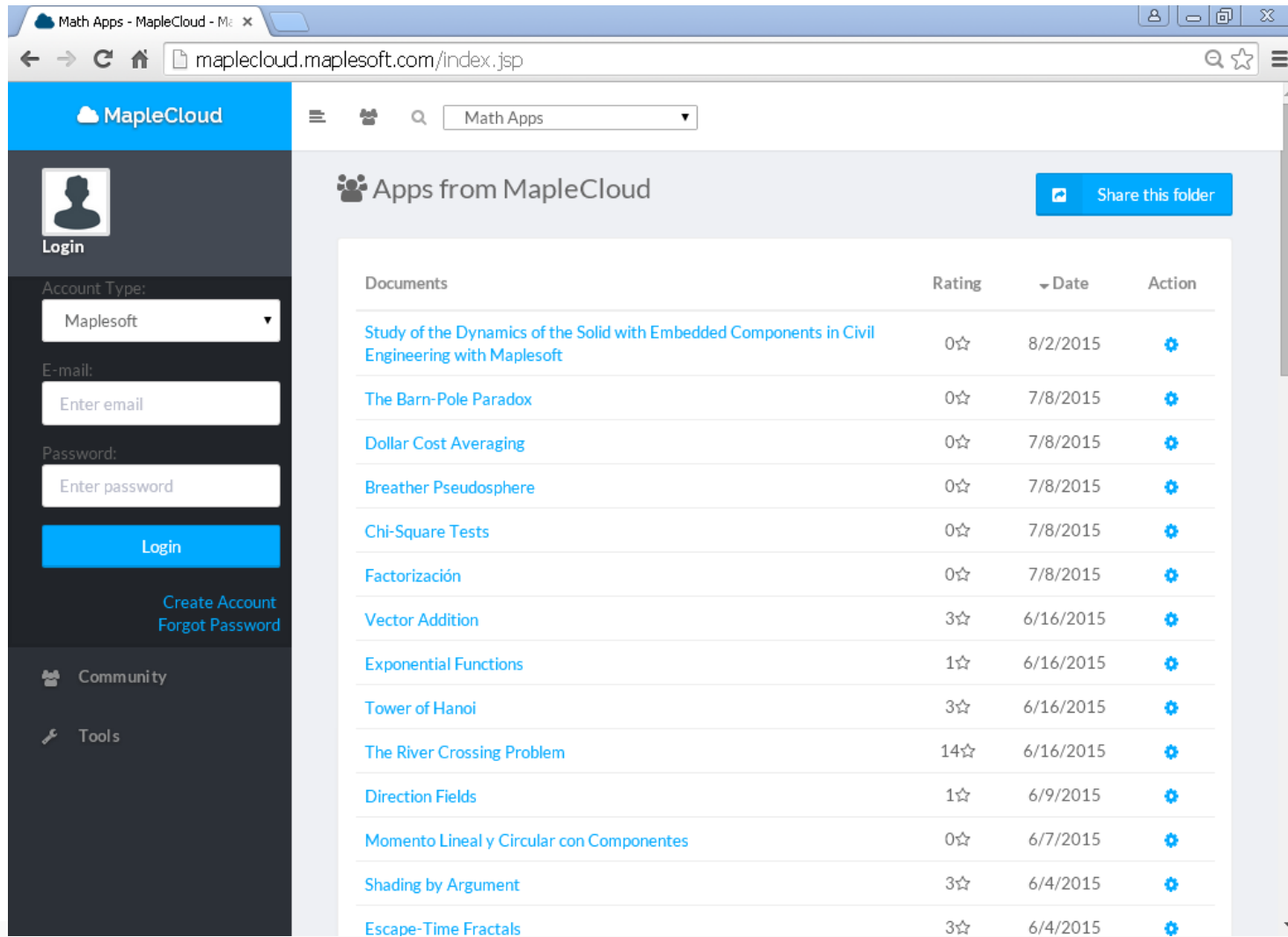
The MapleCloud makes it easy to share your Maple documents and applications with others, even if they don't have Maple!

- **Interactive:** Any Maple document in the MapleCloud that makes use of interactive embedded components such as sliders, dials, and math entry boxes can be used not just viewed, even by people who do not have Maple. Your Math Apps and Maple applications can be used by anyone you choose to share them with, to explore concepts, perform computations, and visualize results.
- **Easy Access:** There are many ways to access the content in the MapleCloud.
 - **Web Browser:** The MapleCloud is accessible from a web browser, from both computers and tablets. You can browse and search collections of Maple content, read documents, and even interact with Maple applications, all without Maple. MapleNet provides the mathematical power behind the applications, so all you need is a standard web browser.
 - **Free Maple Player:** Anyone can access the full MapleCloud from the free Maple Player and interact with the applications there. After downloading the Maple document, the Maple Player can also be used to work offline.
 - **Maple:** Those who have Maple can access MapleCloud content from within Maple, instantly downloading documents from the MapleCloud into their Maple session.
- **Private and Public Sharing:** From inside Maple, you can share your Maple documents in the MapleCloud at a click of a button. You can choose to share your work with members of a private group, such as the students in your class or colleagues on a research project, post them for your own personal use, or make your documents freely accessible by everyone.
- **Ready to Use:** There are hundreds of interactive Math Apps available in the MapleCloud that explore concepts from calculus, statistics, graphing, physics, engineering, and more. You can use these Math Apps in your classes and direct your students to them for additional learning.



III Coloquio Regional de Física - 2015

2

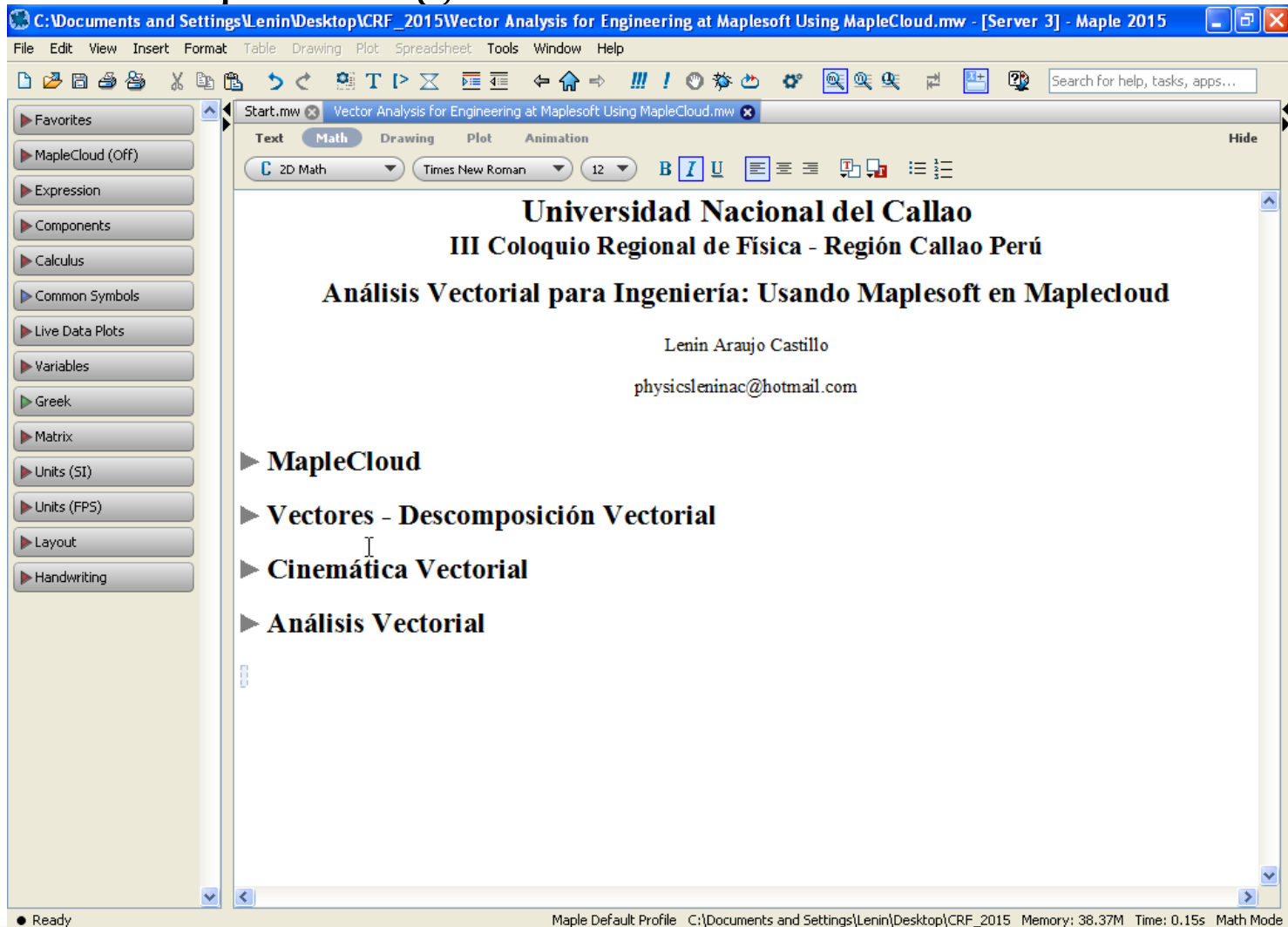


The screenshot shows the MapleCloud website interface. The left sidebar contains a login section with fields for Account Type (Maplesoft), E-mail, and Password, along with a Login button and links for Create Account and Forgot Password. Below the login section are links for Community and Tools. The main content area is titled 'Apps from MapleCloud' and features a table of documents. The table has columns for Documents, Rating, Date, and Action. The documents listed include 'Study of the Dynamics of the Solid with Embedded Components in Civil Engineering with Maplesoft', 'The Barn-Pole Paradox', 'Dollar Cost Averaging', 'Breather Pseudosphere', 'Chi-Square Tests', 'Factorización', 'Vector Addition', 'Exponential Functions', 'Tower of Hanoi', 'The River Crossing Problem', 'Direction Fields', 'Momento Lineal y Circular con Componentes', 'Shading by Argument', and 'Escape-Time Fractals'. Each document has a rating (0 to 14 stars) and a date (ranging from 6/4/2015 to 8/2/2015). A 'Share this folder' button is located in the top right corner of the main content area.

Documents	Rating	Date	Action
Study of the Dynamics of the Solid with Embedded Components in Civil Engineering with Maplesoft	0☆	8/2/2015	✱
The Barn-Pole Paradox	0☆	7/8/2015	✱
Dollar Cost Averaging	0☆	7/8/2015	✱
Breather Pseudosphere	0☆	7/8/2015	✱
Chi-Square Tests	0☆	7/8/2015	✱
Factorización	0☆	7/8/2015	✱
Vector Addition	3☆	6/16/2015	✱
Exponential Functions	1☆	6/16/2015	✱
Tower of Hanoi	3☆	6/16/2015	✱
The River Crossing Problem	14☆	6/16/2015	✱
Direction Fields	1☆	6/9/2015	✱
Momento Lineal y Circular con Componentes	0☆	6/7/2015	✱
Shading by Argument	3☆	6/4/2015	✱
Escape-Time Fractals	3☆	6/4/2015	✱

III Coloquio Regional de Física - 2015

3



III Coloquio Regional de Física - 2015

4

The screenshot displays the MapleCloud web application interface. The browser address bar shows the URL: `maplecloud.maplesoft.com/application.jsp?appId=4922624173932544`. The application header includes the MapleCloud logo and navigation icons. On the left, a sidebar contains a login form with fields for 'Account Type' (set to 'Maplesoft'), 'E-mail', and 'Password', along with a 'Login' button and links for 'Create Account' and 'Forgot Password'. Below the login form are links for 'Community' and 'Tools'. The main content area displays a document titled 'Study of the Dynamics of the Solid with Embedded Components in Civil Engineering with Maplesoft', created by 'physicsleninac@hotmail.com'. The document content includes the title 'Universidad Nacional de Piura', the event 'VI Congreso Nacional del Colegio de Matemáticos del Perú', and the document title 'Study of the Dynamics of the Solid with Embedded Components in Civil Engineering with Maplesoft'. The author is listed as 'Lenin Araujo Castillo' with email 'physicsleninac@hotmail.com'. A table of contents follows, listing sections from 'Introduction' to 'Bibliography'.

Study of the Dynamics of the Solid with Embedded Components in Civil Engineering with Maplesoft
Maple App created by physicsleninac@hotmail.com

Universidad Nacional de Piura
VI Congreso Nacional del Colegio de Matemáticos del Perú
Study of the Dynamics of the Solid with Embedded Components in Civil Engineering with Maplesoft
Lenin Araujo Castillo
physicsleninac@hotmail.com

- Introduction
- Solid operating structure with embedded components
- Vector Analysis: Calculation of Moments
- Planar Kinematics of a Rigid Body
- Planar Kinetics of a Rigid Body: Force and Acceleration
- Complete model
- Bibliography

III Coloquio Regional de Física - 2015

5

The screenshot shows the MapleSim web application interface. On the left is a dark sidebar with a login section containing fields for email and password, and a blue 'Login' button. Below the login section are links for 'Create Account' and 'Forgot Password', and a 'Community' link. The main workspace has a top navigation bar with 'MapleCloud' and 'MapleSim' logos. The central area displays a problem titled 'Implementación de un modelo sencillo'. The problem text is in Spanish: 'Crear un vector, con funciones de variable real, que se evalúe para $0 \leq t \leq 10$, luego halle su módulo. Sugerencia: Puede utilizar los CE MathContainer, TextArea y Dial.' To the right of the text is a diagram showing a workflow: 'inserción del' points to a 'Text Area' box, which points to a 'Dial' component labeled $\int f(x) dx$, which points to another 'Text Area' box. Further right is a simulation area with a 'Dial' component showing a value of 10.488, a 'Text Area' box containing the vector $A = \langle t+1, t, 5 \rangle$, and a 'List View' component showing a column vector $\begin{bmatrix} 7 \\ 6 \\ 5 \end{bmatrix}$.

Implementación de un modelo sencillo

Problema

Crear un vector, con funciones de variable real, que se evalúe para $0 \leq t \leq 10$, luego halle su módulo.

Sugerencia: Puede utilizar los CE MathContainer, TextArea y Dial.

Diagram components:

- Diagram showing a workflow: "inserción del" points to a "Text Area" box, which points to a "Dial" component labeled $\int f(x) dx$, which points to another "Text Area" box.
- Simulation area showing a "Dial" component with a value of 10.488, a "Text Area" box containing the vector $A = \langle t+1, t, 5 \rangle$, and a "List View" component showing a column vector $\begin{bmatrix} 7 \\ 6 \\ 5 \end{bmatrix}$.

- Vector Analysis: Calculation of Moments
- Planar Kinematics of a Rigid Body
- Planar Kinetics of a Rigid Body: Force and Acceleration
- Complete model
- Bibliography

III Coloquio Regional de Física - 2015

6

The screenshot shows the MapleCloud web application. On the left is a dark sidebar with a login form and navigation links. The main workspace has a light blue header with 'MapleCloud' and 'MapleSim' logos. Below the header, the title 'Análisis' is displayed. The main content area is titled 'Implementación de un modelo sencillo' and contains a problem statement, a diagram of a simulation model, and a list of topics.

MapleCloud

Login

Account Type:
Maplesoft

E-mail:
Enter email

Password:
Enter password

Login

[Create Account](#)
[Forgot Password](#)

Community

Tools

Análisis

MapleSim

▼ Implementación de un modelo sencillo

Problema

Crear un vector, con funciones de variable real; que se evalúe para $0 \leq t \leq 10$, luego halle su módulo.
Sugerencia: Puede utilizar los CE MathContainer, TextArea y Dial.

Diagrama de flujo:

- inserción del
- Text Area
- $\int f(x) dx$
- Text Area

Simulación:

$A = \langle t^2, 5 \cdot t, t + 2 \rangle$ UL

$\begin{bmatrix} 4 \\ 10 \\ 4 \end{bmatrix}$

11.489

► Vector Analysis: Calculation of Moments

► Planar Kinematics of a Rigid Body

► Planar Kinetics of a Rigid Body: Force and Acceleration

► Complete model

► Bibliography

III Coloquio Regional de Física - 2015

7

Fuerzas Conservativas - Map

maplecloud.maplesoft.com/application.jsp?appId=5679331560914944

MapleCloud

Login

Account Type: Maplesoft

E-mail: Enter email

Password: Enter password

Login

Create Account
Forgot Password

Community

Tools

Fuerzas Conservativas
Maple App created by physicsleninac@hotmail.com

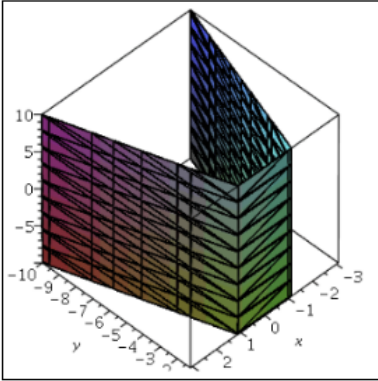
Share Download

▼ Usando Componentes Embedded

Ingrese el potencial escalar:

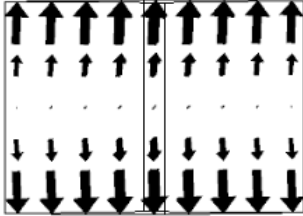
$V = x^2 + y$

Gráfica del Potencial



Gráfica del Vector Gradiente de V

$\begin{bmatrix} -2x \\ -1 \\ 0 \end{bmatrix}$



III Coloquio Regional de Física - 2015

8

Momento Lineal y Circular con Componentes

Maple App created by physicsleninac@hotmail.com

Share Download

Equations:

$$m \cdot v_1 + \int_{t_1}^{t_2} F_x dt = m \cdot v_2$$
$$(m \cdot v_{1x}) + \int_{t_1}^{t_2} F_{x\,at} = m \cdot v_{2x}$$
$$(m \cdot v_{1y}) + \int_{t_1}^{t_2} F_{y\,at} = m \cdot v_{2y}$$
$$(m \cdot v_{1z}) + \int_{t_1}^{t_2} F_{z\,at} = m \cdot v_{2z}$$

Parameters:

- $m = 2$ kg
- $F_x(t) = 2 \cdot t^2$ N
- $F_y(t) = 2 \cdot t^2$ N
- $F_z(t) = 2 \cdot t^2$ N
- $t_1 = 4$ s
- $t_2 = 8$ s
- $r_1 = t^2 + 1, 5$ m
- $r_2 = t^2 + 1, t^2, 5$ m
- $\text{para } t = 0$ s
- $F = t + 1, t^2$ N
- $t_1 =$

Results:

- $v_{1x} = -129.33$
- $v_{2x} = \frac{508}{3}$ m/s
- $v_{1y} = -129.33$
- $v_{2y} = \frac{508}{3}$ m/s
- $v_{1z} = 169.33$
- $v_{2z} = 169.33$ m/s

III Coloquio Regional de Física - 2015

9

C:\Documents and Settings\Lenin\Desktop\CRF_2015\Vector Analysis for Engineering at Maplesoft Using MapleCloud.mw* - [Server 3] - Maple 2015

File Edit View Insert Format Table Drawing Plot Spreadsheet Tools Window Help

Start.mw *Vector Analysis for Engineering at Maplesoft Using MapleCloud.mw

Text Math Drawing Plot Animation

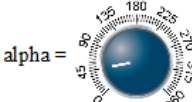
Heading 1 Times New Roman 18 B I U

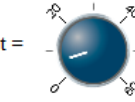
Search for help, tasks, apps...

Favorites

- MapleCloud (Off)
- Expression
- Components
- Calculus
- Common Symbols
- Live Data Plots
- Variables
- Greek
- Matrix
- Units (SI)
- Units (FPS)
- Layout
- Handwriting

Ingrese el vector:

alpha =  45 ° (1/4) * Pi rad

t =  6 s

v[x] = $t + 10$ i

v[y] = $t^2 + 20$ j

v[y] = $t + 10$ k

Visualizar:

 $\begin{bmatrix} t+10 \\ t^2+20 \\ t+10 \end{bmatrix}$ $\begin{bmatrix} 16. \\ 56. \\ 16. \end{bmatrix}$ U

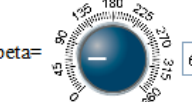
Componentes de un vector en función de un ángulo:

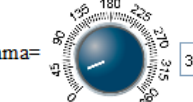
Plano:

$|v| \cos(\alpha), |v| \sin(\alpha)$

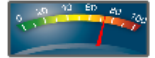
$\begin{bmatrix} 42.70831300 \\ 42.70831300 \\ 0. \end{bmatrix}$

Espacio

beta =  60 ° (1/3) * Pi rad

gamma =  30 ° (1/6) * Pi rad

$\begin{bmatrix} 42.70831300 \\ 30.19933774 \\ 52.30678733 \end{bmatrix}$

 73.97296804 U

Maple Default Profile C:\Documents and Settings\Lenin\Desktop\CRF_2015 Memory: 38.37M Time: 0.15s Text Mode

III Coloquio Regional de Física - 2015

10

C:\Documents and Settings\Lenin\Desktop\CRF_2015\Vector Analysis for Engineering at Maplesoft Using MapleCloud.mw* - [Server 3] - Maple 2015

File Edit View Insert Format Table Drawing Plot Spreadsheet Tools Window Help

Start.mw *Vector Analysis for Engineering at Maplesoft Using MapleCloud.mw

Text Math Drawing Plot Animation Hide

P Heading 1 Times New Roman 18 B I U

Ingrese los componentes de r:

rx = $\sin(t)$ ry = $t \sin(t)$ rz = $\exp(t)$

$\mathbf{r} = \begin{bmatrix} \sin(t) \\ t \sin(t) \\ e^t \end{bmatrix} = \begin{bmatrix} 17. \\ -0.6536436209 \\ 5. \end{bmatrix} \text{ m}$

$t = 4$

Tiempo para la velocidad: $t = 4$

Tiempo para la aceleración: $t = 4$

Gráfica

Calculando la velocidad para $0 \leq t \leq 10$:

$\mathbf{v} = \begin{bmatrix} \cos(t) \\ \sin(t) + t \cos(t) \\ e^t \end{bmatrix} = \begin{bmatrix} -0.6536436209 \\ -3.371376979 \\ 54.59815003 \end{bmatrix}$

54.706 m/s

Calculando la aceleración para $0 \leq t \leq 10$:

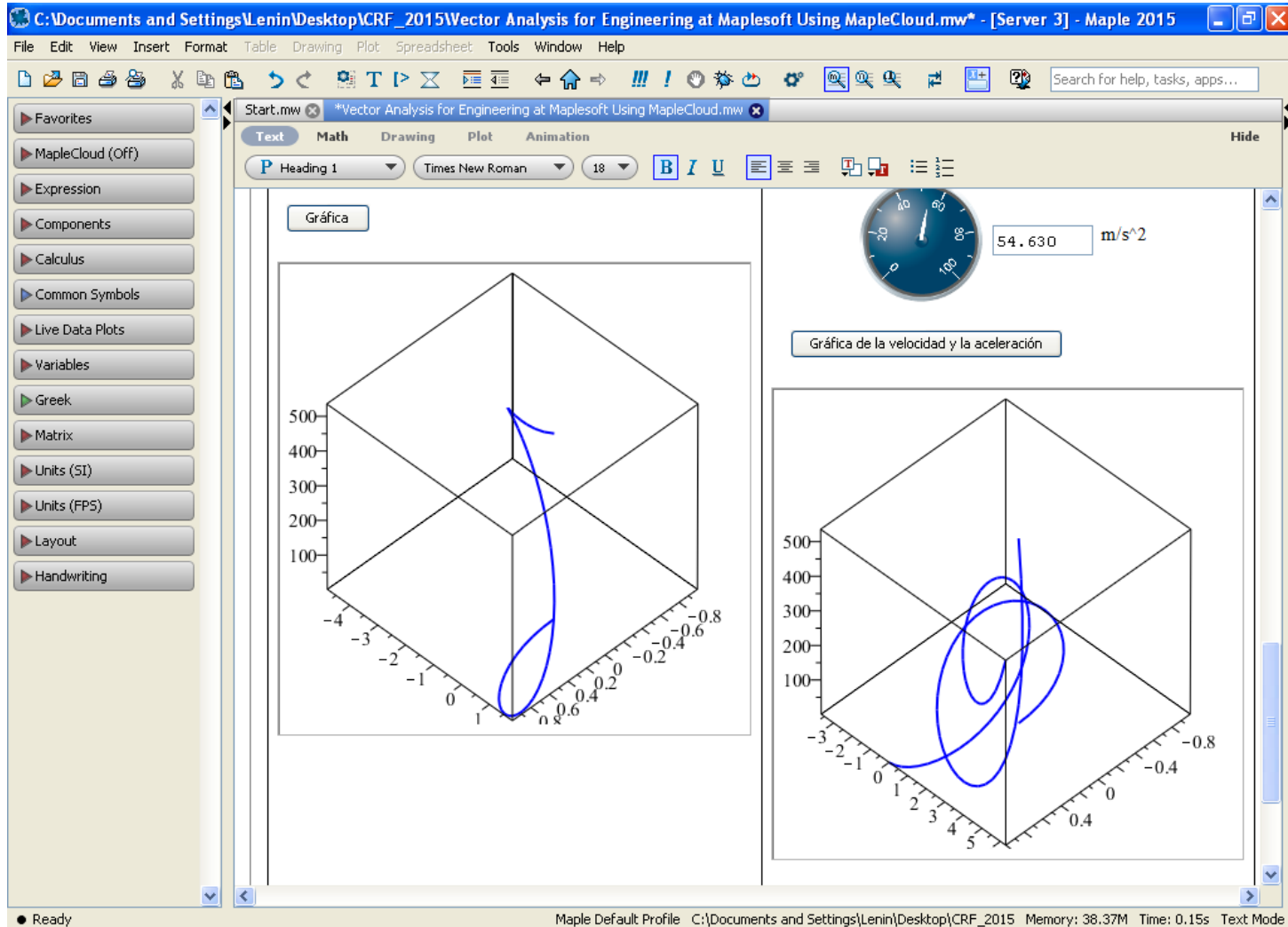
$\mathbf{a} = \begin{bmatrix} -\sin(t) \\ 2 \cos(t) - t \sin(t) \\ e^t \end{bmatrix} = \begin{bmatrix} 0.7568024953 \\ 1.719922739 \\ 54.59815003 \end{bmatrix}$

54.630 m/s²

Ready Maple Default Profile C:\Documents and Settings\Lenin\Desktop\CRF_2015 Memory: 38.37M Time: 0.15s Text Mode

III Coloquio Regional de Física - 2015

11



III Coloquio Regional de Física - 2015

12

- Tener las aplicaciones guardadas en la nube.
- Usar el motor de calculo en línea.
- Actualizar continuamente las aplicaciones.
- Soporte para Windows, Mac y Linux.
- Interactividad total con los estudiantes.
- Administración publica o privada.