



An Introduction to EDU

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Presentation Plan

- ★ What is EDU?
- ★ Educational benefits
- ★ EDU use at NU
- ★ Software features
- ★ Grants & contracts
- ★ Other users

EDU 1.6 Alpha - Psyc350 - Microsoft Internet Explorer

File Edit View Favorites Tools Help Address <http://calculus.unl.edu/edu/classes/psyc350/> Go

Class Homepage powered by BROWNSTONE

Please bookmark this page. It will be your starting point for all activity in this class.

Student Menu Select an option below:

- ▶ Register for this class
- ▶ Select an Assignment:

U1-Research Hypotheses
U1-Validity Types
U1 - External Validity
U1 - Sampling
U1 - Internal Validity

▶ View Past Results or Change Password

Class

▶ **Psyc350**

▶ **University of Nebraska - Lincoln**
Not the correct class? Search for your class [here.](#)

Instructor

▶ **Calvin P Garbin**

Proctors & Instructors:

- ▶ Instructor Login
- ▶ Proctor Login

Done Internet

Introducing EDU

- ✦ Student assessment over the Web
- ✦ Software developed out of UNL
- ✦ Used by thousands of UNL students
- ✦ Used by schools across the country
- ✦ <http://calculus.unl.edu/edu/classes/demo/>



Introducing EDU

Educational Benefits

Repeatable computer graded homework, quizzes, tests, exams, tutorials...

Mastery Learning

- ✦ Outcomes orientation
- ✦ Students responsible for their success



Introducing EDU > Educational Benefits

Mastery Learning

- ★ Very effective learning strategy
- ★ Very resource intensive



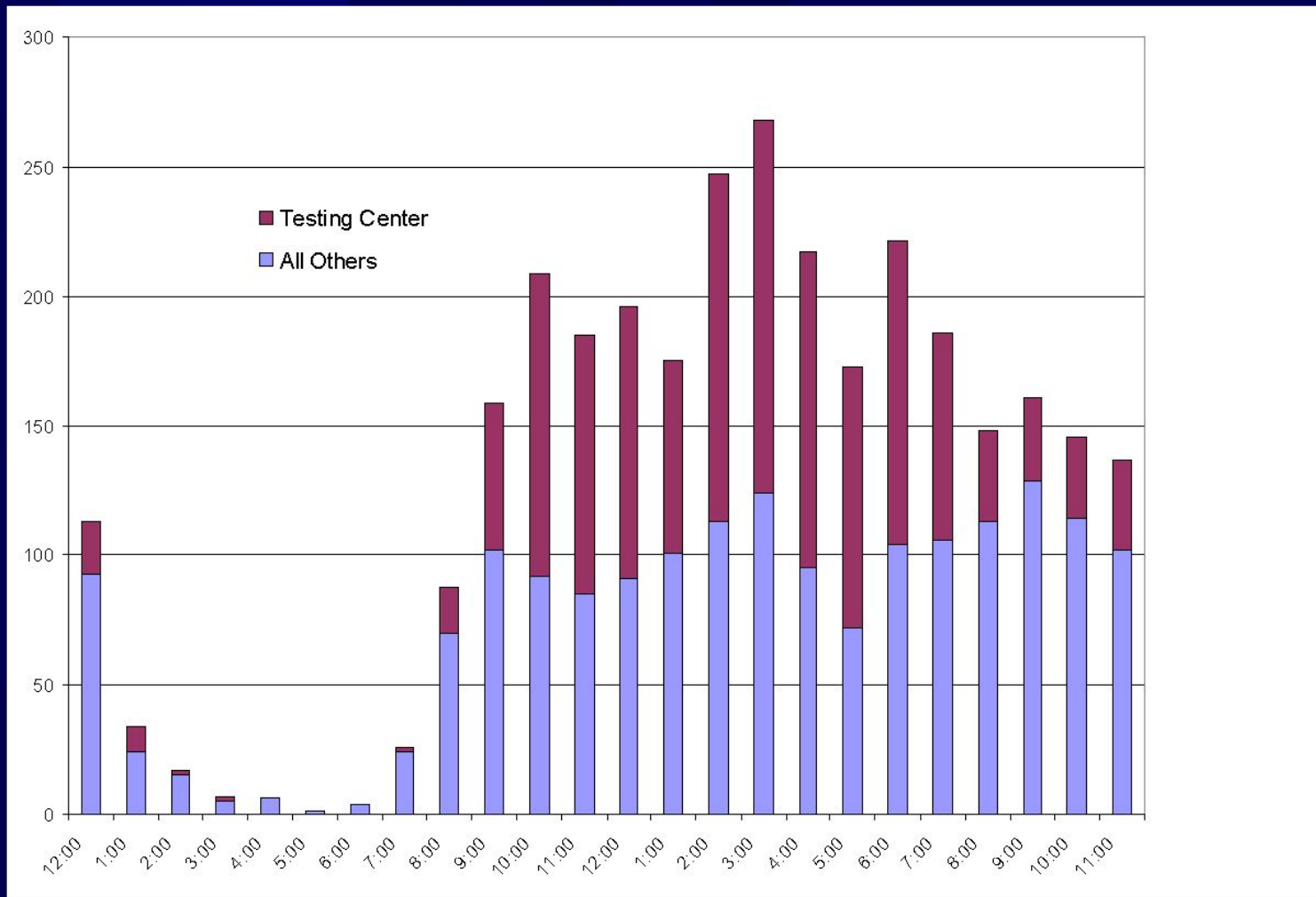
Introducing EDU > Educational Benefits

On-Line Mastery Learning

- ✦ Mastery learning is *very* resource-intensive, but...
- ✦ The Web enables:
 - ✦ Repeatable assignments
 - ✦ Automatic grading
 - ✦ Individualized assignments
 - ✦ 24/7 access

Introducing EDU > Educational Benefits

24/7 Access



EDU at UNL

- ✦ Project begun in Math Dept in 1996
- ✦ Invited other departments to use system
- ✦ NU Foundation and College of Arts & Sciences Testing Center, 1999
- ✦ Commercial development since 1998



EDU at UNL

Case Study: Calculus

- ★ In 1994 we moved to a “reform” course
 - ★ Adopted new text
 - ★ Greater emphasis on applications
 - ★ Projects, homework, group work
- ★ Follow-up
 - ★ Concerns about partial credit
- ★ On-Line Gateway Exams
 - ★ Introduced in 1996
 - ★ Require high standards
 - ★ Protect classroom time

EDU at UNL > Case Study

Gateway Exams

★ Calculus I

- ★ Single “Gateway Exam”
- ★ One retake per day over 3 week period
- ★ All-or-nothing credit for 10% of final grade
- ★ Students work under proctor supervision
- ★ Covers basic computation skills of calculus
- ★ 600+ students per semester

EDU at UNL

UNL Testing Center

- ★ 60+20 Computers, hi-tech classroom, tutoring environment
- ★ Grant from NU Foundation and College of Arts and Sciences, 1999
- ★ Serves Math 102, 103, 106, 107, 203; Psyc 181, PoIS 100, Astr 103...





EDU at UNL

Disciplines Served

Accounting

Ag. Marketing

Agro. & Hort.

Anthropology

Architecture

Astronomy

Biochemistry

Biological Sciences

Bio Systems Eng.

Children, Family & Law

Chemistry

Civil Engineering

Communication Studies

Computer Science

Const. Management

Curr & Instruction

Educational Psych.

Electrical Eng.

Entomology

Family & Consumer Science

Geography

Geosciences

History

Industrial Eng.

Libraries

Mathematics

Modern Languages

Natural Resource Sciences

Physics

Political Science

Psychology

School of Music

Veterinary Science

Lincoln High School



EDU at UNL > Disciplines Served

Active Classes

Fall 2003

170 active classes set up



EDU at UNL

Students Served

Fall 2003

Student accounts: 10,650

Active (5+ sess.): 7,075

Spring 2004

Student accounts: 8,863

Active (5+ sess.): 5,310



EDU at UNL

Assignments Graded

Fall 2003

Total assignments: 277,148

Daily average: 2,500

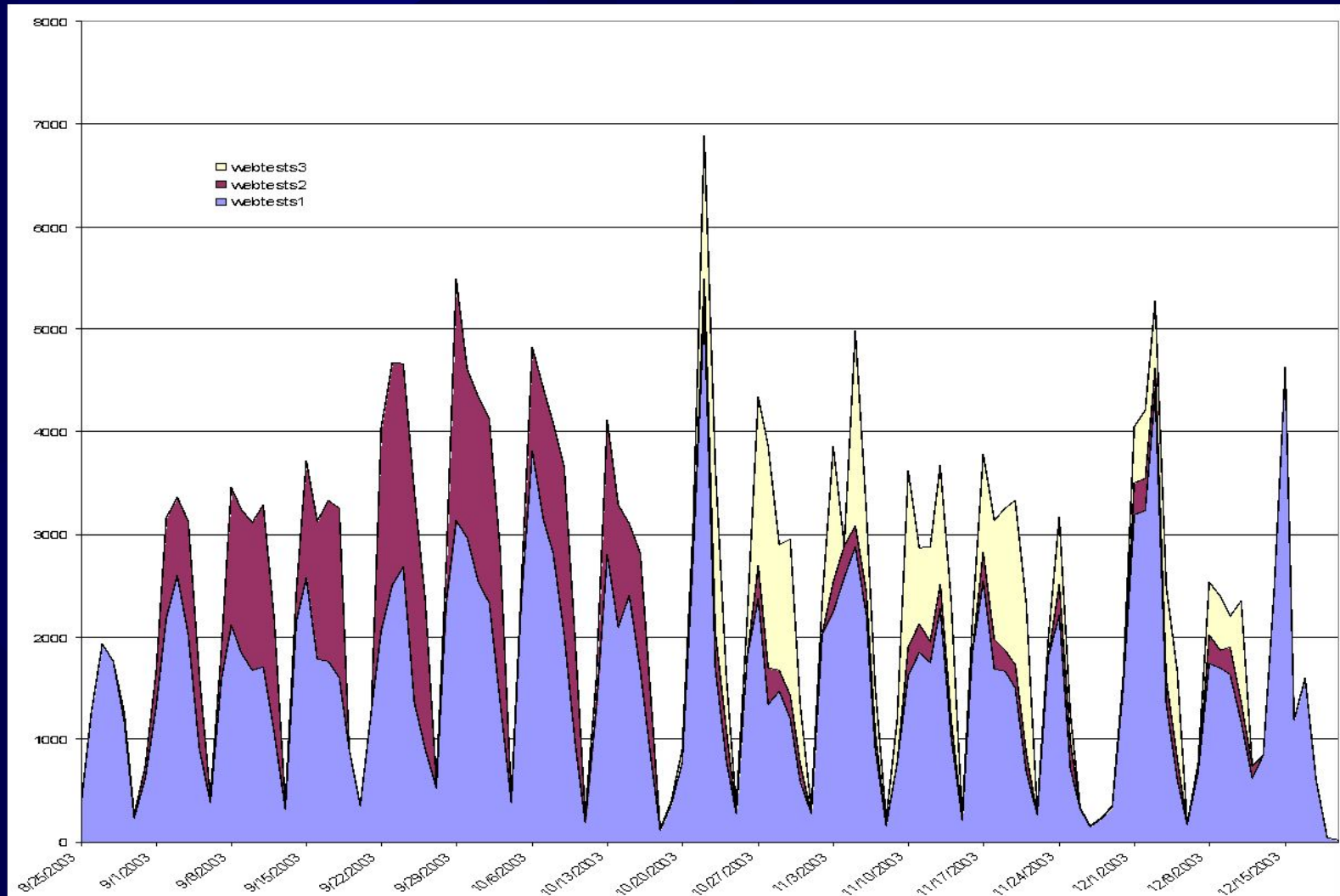
Spring 2004

Total assignments: 292,888

Daily average: 2,650

EDU at UNL > Assignments Graded

Demand: Peaks & Troughs



EDU at UNL > Assignments Graded

Cost Savings

Fall 2003

Total assignments: 277,148

GTA hourly rate: \$20

GTA assignments/hour: 10

Cost of human grading: \$554,296



EDU at UNL

Infrastructure

- ✦ Sysadmin
- ✦ Help Desk
- ✦ Three Redhat Linux boxes
- ✦ Apache front-end, load balancing
- ✦ Blackboard plugin



EDU at UNL > Infrastructure

Server Load

Fall 2003

Total pages: 11,696,020

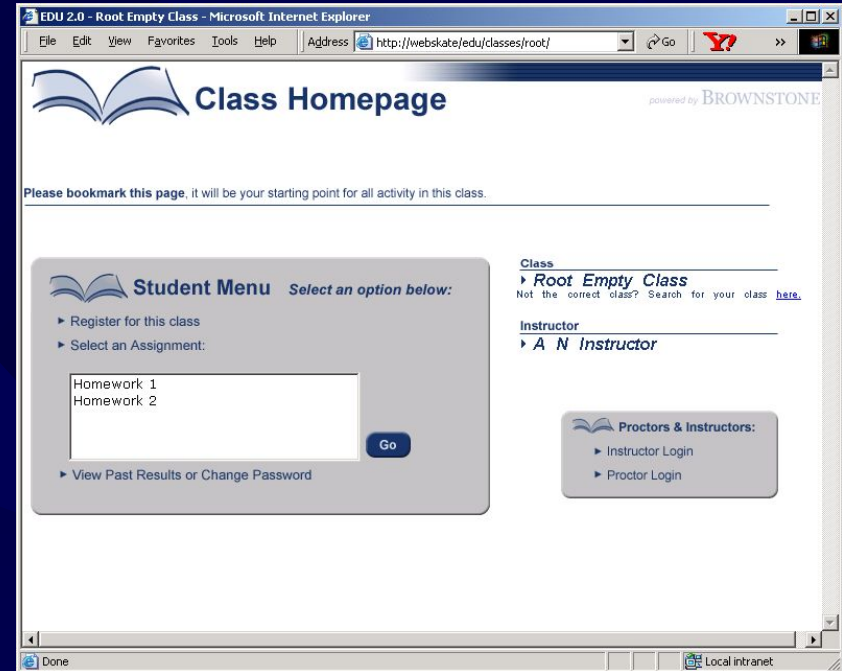
Ave. pages/day: 100,000

Peak pages/day: 200,000

Raw HTTPs (10/14/03): 183,357

The EDU Software

- ★ Assignment modes
- ★ Question types
- ★ Assignment creation
- ★ Question writing
- ★ Grade book



The EDU Software

Key Features

1 2 3 4 5

★ Multiple Assignment Modes

- ★ Anonymous
- ★ Homework
- ★ Printable
- ★ Proctored
- ★ Tutorial
- ★ “Mastery”

http://john.brownstone.net:8080/modules/practiceTest.Login - Micros...

File Edit View Favorites Tools Help

Practice Session - No Credit Awarded powered by BROWNSTONE

BACK NEXT JUMP TO: Question 3 GRADE QUIT

Question 1: (1 point)

The graph below shows the function $f(x) = x(8-x)e^{-0.34x}$

Use Riemann sums on the graph to estimate $\int_0^8 f(x) dx$

Ans:

Math Mode



The EDU Software

Key Features

1 2 3 4 5

- ★ Sophisticated question types
 - ★ Fill in blank
 - ★ Short phrase
 - ★ Numeric with units
 - ★ Mathematical content
 - ★ Graph sketching
 - ★ Spreadsheet
 - ★ Multipart questions
 - ★ ...and many more

The EDU Software

Key Features

1 2 3 4 5

★ Easy Assignment Creation

★ Three step creation wizard

★ Write your own questions or use pre-loaded banks

The screenshot shows a web browser window titled "EDU 2.0 - Root Empty Class - Microsoft Internet Explorer". The address bar shows "http://webskate/edu/modules/classEditor .Quest". The page title is "Assignment Editor" with a sub-header "powered by BROWNSTONE". The interface includes a navigation bar with four steps: "1. Choose Name", "2. Select Questions", "3. Set Policies", and "4. Review & Finish". A sidebar on the left contains navigation icons for home, search, and help. The main content area is divided into three sections: "TYPE OF ASSIGNMENT:", "FEEDBACK:", and "ASSIGNMENT PROPERTIES:".

TYPE OF ASSIGNMENT:

- Anonymous practice
- Homework or quiz
 - Always rework the same assignment on return
 - Offer printable version of assignment
- Proctored Exam (Requires proctor sign-in to grade)
 - Also require proctor sign-in to start session
- Mastery dialog
 - [Edit mastery policies](#)
- Study session dialog
- Hide assignment from view

FEEDBACK:

- Show hints during the assignment
- Show the final grade at the end of the assignment
- Show feedback at the end of the assignment
- Restrict grade and/or feedback until the assignment's end date (If you have chosen to display grades and/or feedback above, then this option will delay their display until after the end date.)
- Send email reports to

ASSIGNMENT PROPERTIES:

Passing score: out of 2

Time limit: minutes

Questions per page: 1

The EDU Software

Key Features

1 2 3 4 5

- ★ Fully-featured Grade Book
 - ★ Traditional tabular grade book
 - ★ Analyze assignments and questions

Name	Quiz 6	Quiz 5	Quiz 4	Total	Weighted %
Mark F. Antonson	2	2	2	6	0%
Lisa M. Austin	2	2	2	6	0%
Carmen A. Ayala	2	2	2	6	0%
Mark R. Bales	2	2	2	6	0%
Gaston D. Baletka	2	0	2	4	0%



The EDU Software

EDU and Mastery Learning

- ★ Designed for mastery learning
- ★ Repeatable assignments
 - ★ Question selection schemes
 - ★ Algorithmic questions
- ★ Sophisticated hints and feedback

The EDU Software > Mastery Learning Question Selection

The screenshot displays the 'EDU 2.0 - Math Technology EXPO' interface within a Microsoft Internet Explorer browser window. The address bar shows the URL: `-rover04/modules/classEditor.QuestionChooser`. The interface is divided into four steps: 1. Choose Name, 2. Select Questions, 3. Set Policies, and 4. Review & Finish. The 'Question Bank' is set to 'More Sample Questions'. On the left, a list of question categories is shown with checkboxes and 'Add' buttons:

- 1. Basic Question Types
Question types can be generated algorithmically.
- 2. Math Question Types
Shows examples of math question types, generated algorithmically.
- 3. Advanced Graphical Questions
Shows examples of graphical questions, generated algorithmically.
 - Dynamically-generated Figure Labels** (Engineering/Physics) [Add]
 - Dynamic Figure Labels** (Economics) [Add]
 - Dynamically-generated Graph** (Powered by Maple) [Add]
 - Dynamically-generated Function Plot and Math Content** (Powered by Maple) [Add]

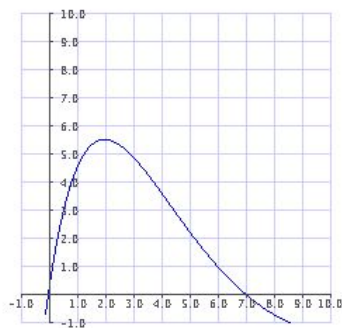
On the right, the 'Selected Questions' area shows a list of items with checkboxes and point values:

- 1. Basic Question Types (Points: 5) - *Question types can be generated algorithmically.*
Select 2 of 4 questions in this group
 - Matching
 - Fill-in-the-blank (Drop-down Box)
 - Short Phrase (Exact Match)
 - Short Phrase (Key Word Matching)
- 2. Clickable Image Map (Points: 3)
- 3. Multipart Math Question Mixed Formats (Points: 3)
- 4. Advanced Graphical Questions (Points: 4) - *Shows examples of graphical questions, generated algorithmically.*

At the bottom right, there is a 'Total Points' field set to 20 and a 'Select 1 / 2' indicator.

The EDU Software > Mastery Learning Algorithmic Questions

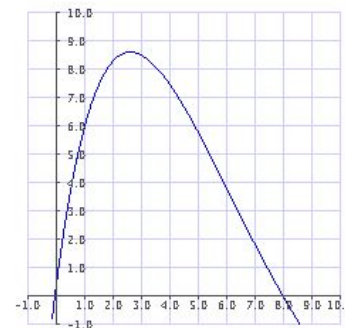
The graph below shows the function $f(x) = x(7-x)e^{-0.30x}$



Use Riemann sums on the graph to estimate $\int_0^7 f(x)dx$

This question accepts numbers and formulas with units.
[Help](#) | [Change Math Entry Mode](#) | [Preview](#)

The graph below shows the function $f(x) = x(8-x)e^{-0.19x}$



Use Riemann sums on the graph to estimate $\int_0^8 f(x)dx$

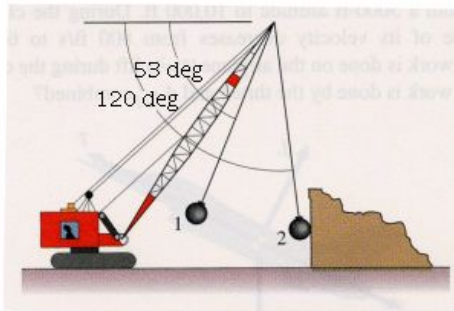
This question accepts numbers and formulas with units.
[Help](#) | [Change Math Entry Mode](#) | [Preview](#)

```
$a = range(4, 9); $k = decimal(2, rand(1, 2));  
$right = sum(x, 1, $a, x($a-x)e^(-$k x));  
$low = $right - 3; $high = $right + 3;
```

The EDU Software > Mastery Learning

Immediate Feedback

A 280 kg wrecker's ball hangs from a 7 meter cable. If it is stationary at position 1, what is the magnitude of its velocity just before it hits the wall at position 2?



Your answer: 1.7m/s



The ball starts at a distance $7\sin(53^\circ)$ m below the pulley, and at the end of its swing it has fallen to a distance $7\sin(120^\circ)$ m below the pulley. As a result the force due to the weight of the ball has moved through a distance of $7(\sin(120^\circ) - \sin(53^\circ))$. All the potential energy from this movement has been converted into kinetic energy and so the ball has gained $7 \times (\sin(53^\circ) - \sin(120^\circ)) \times 280 \times 9.8$

Joules. Solve $\frac{1}{2} \times 280 \times v^2 = 36$ to get the velocity as 3.0 m/s

- Engineering



The EDU Software

Quantitative EDU

- ★ Strengths in numeric/quantitative questions
- ★ Content-based math grading
 - ★ Formula grading
 - ★ Graph sketching
 - ★ Maple T.A.
- ★ Embedded MathML
 - ★ MathML editor in Question Bank Editor
 - ★ LaTeX question authoring
 - ★ WYSIWYG math entry for students

Formula Grading

- ★ Grade on content:

$$xe^x + e^x \text{ equals } (1+x)e^x$$

- ★ Recognize:

- ★ Natural syntax: $x \sin x$

- ★ Vectors, lists, etc: $(1/\sqrt{2}, 3)$

- ★ Equations: $y=x-1$ equals $y+1=x$

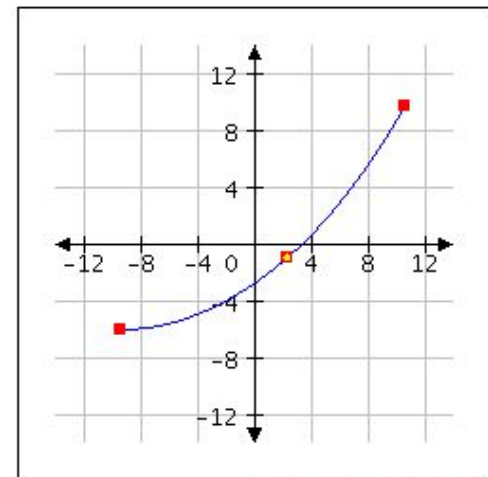
- ★ Integrals: $x \ln(x)$ equals $x \ln(x) + 1$

The EDU Software > Quantitative EDU

Graph Sketching

- ✦ Click out spline nodes
- ✦ Qualitative and quantitative grading

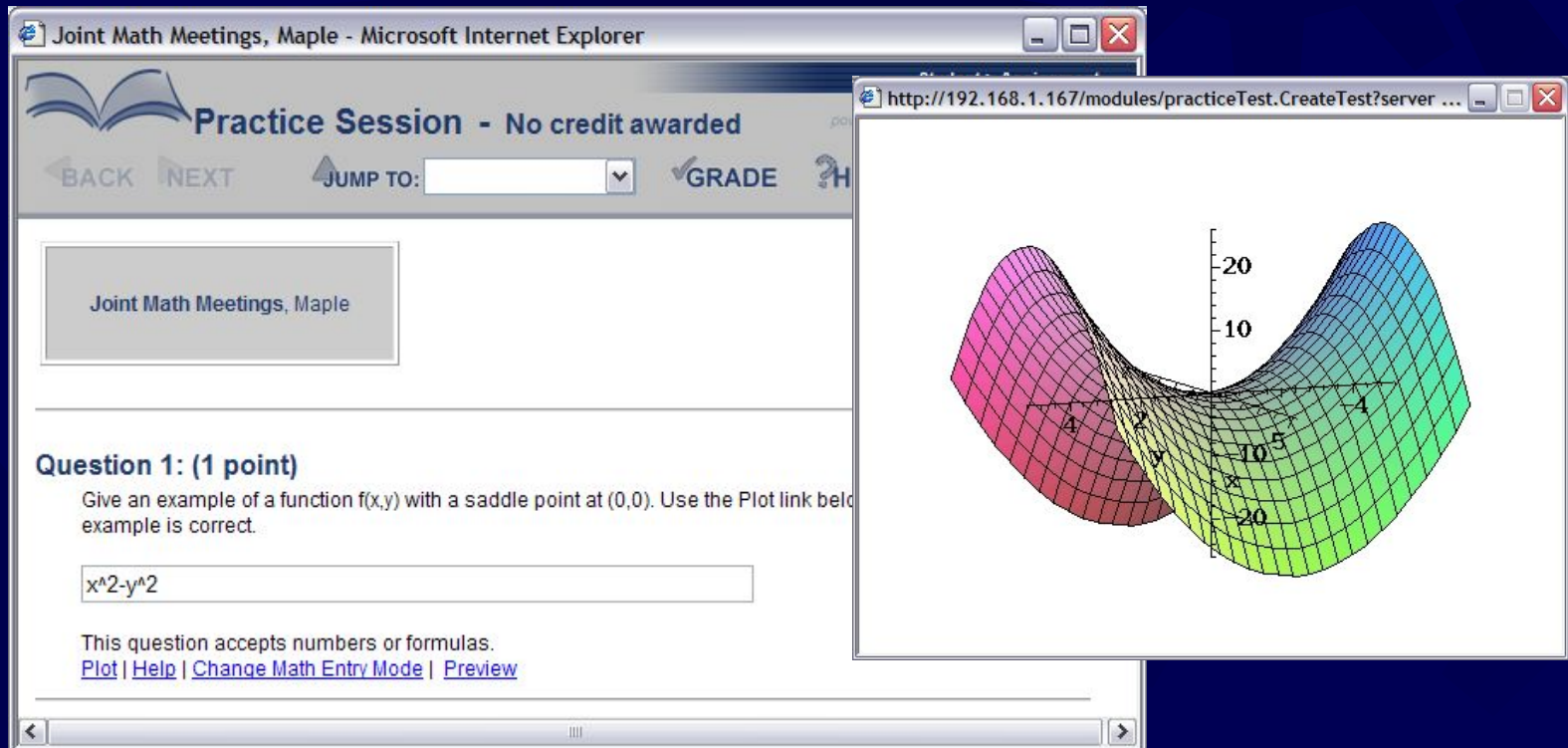
Sketch a curve that is increasing and concave up.



[Delete Selected](#) | [Clear](#)

The EDU Software > Quantitative EDU Maple

- ★ Grade by evaluating Maple expression
- ★ Maple algorithms and plots




The screenshot displays a web browser window titled "Joint Math Meetings, Maple - Microsoft Internet Explorer". The page content includes a navigation bar with "BACK", "NEXT", "JUMP TO:" (with a dropdown menu), "GRADE", and a help icon. Below this is a button labeled "Joint Math Meetings, Maple".

Question 1: (1 point)
Give an example of a function $f(x,y)$ with a saddle point at $(0,0)$. Use the Plot link below. Your example is correct.

This question accepts numbers or formulas.
[Plot](#) | [Help](#) | [Change Math Entry Mode](#) | [Preview](#)

An inset window shows a 3D plot of the function $f(x,y) = x^2 - y^2$, which is a saddle surface. The surface is colored with a gradient from pink to green. The vertical z-axis is labeled with values 20, 10, 0, -10, and -20. The horizontal x and y axes are also labeled with values 4, 2, and -2.



The EDU Software > EDU and Math
Maple

“Give an example of a function $f(x,y)$ that has a saddle point at $(0,0)$ ”

The EDU Software > EDU and Math MathML Editor

The screenshot shows a web browser window titled "EDU 2.0 - Root Empty Class - Microsoft Internet Explorer". The address bar shows the URL "http://webskate/edu/modules/configureTest.Loc". The page title is "Question Bank Editor" and it is powered by "BROWNSTONE".

The interface is divided into several sections:

- Navigation and Actions:** A top bar contains "Cancel" and "OK" buttons. Below it, a "Topics in this Question Bank" section lists "Calculus" with sub-options: "Add a question", "Delete the topic", "Rename the topic", "Move up", and "Move down".
- Problem Statement:** The main area displays the text "Evaluate $\int_0^1 f(x) dx$ where $f(x) = \frac{x}{\sqrt{1+x^2}}$ ".
- MathML Editor:** A text area on the left shows the underlying MathML code for the problem statement, including tags like $\langle \mathit{math} \rangle$, $\langle \mathit{mrow} \rangle$, $\langle \mathit{msubsup} \rangle$, $\langle \mathit{mo} \rangle$, $\langle \mathit{int} \rangle$, $\langle \mathit{mn} \rangle$, and $\langle \mathit{mfrac} \rangle$.
- Rendering:** A preview window on the right shows the rendered mathematical expression $\int_0^1 f(x) dx$.

The bottom of the browser window shows a "Local intranet" status bar.

The EDU Software > Quantitative EDU Math in Inline Questions

The screenshot displays the 'In-Line Question Editor' window. The main editing area contains the question: (a) Compute $\frac{d}{dx} x^2 e^{-x}$; (b) Find |. The answer for part (a) is $(2x-x^2)e^{-x}$. A 'Math Input' dialog box is open, showing the expression $\frac{d}{dx} 18x^{-4} e^{2x}$ with a red cursor at the end. The dialog box includes a toolbar with mathematical symbols like square root, integral, division, multiplication, infinity, and a question mark. Below the input field are 'Cancel' and 'OK' buttons. The main window has a menu bar (File, Edit, Format, Help) and a toolbar with icons for undo, redo, bold, italic, underline, and summation. The status bar at the bottom indicates 'Java Applet Window'.

In-Line Question Editor

File Edit Format Help

Editor HTML

(a) Compute $\frac{d}{dx} x^2 e^{-x}$; (b) Find |

$(2x-x^2)e^{-x}$

Math Input

$\frac{d}{dx} 18x^{-4} e^{2x}$

Cancel OK

Java Applet Window

The EDU software

EDU and Blackboard

- ★ Brownstone is a Blackboard Building Blocks Partner
- ★ EDU can be used transparently within Blackboard



The EDU software > EDU and Blackboard Blackboard Plugin

★ EDU in Bb Control Panel

COURSES > MATH 106 - FALL 2003 > CONTROL PANEL

M106F2003: Math 106 - Fall 2003 - John Orr (Instructor)

Content Areas	
Course Information	Assignments
Course Documents	External Links

Course Tools	
Announcements	Collaboration
Course Calendar	Digital Drop Box
Staff Information	EDU Assignment Editor
Tasks	EDU Question Editor
Discussion Boards	EDU Gradebook
Send E-mail	

Course Options	
Manage Course Menu	Import Course Cartridge
Archive Course	Import Package
Recycle Course	Resources
Manage Tools	Course Copy
Settings	Export Course

User Management	
List / Modify Users	Enroll User
Create User	Remove Users from the Course
Batch Create Users for Course	Manage Groups

Assessment	
Test Manager	Gradebook
Survey Manager	Course Statistics
Pool Manager	

Support	
Support	
Manual	
Contact System Administrator	

POWERED BY
Bb
Blackboard

The EDU software > EDU and Blackboard Blackboard Plugin

Full EDU
capabilities
inside Bb
experience

Blackboard Learning System TM (Release 6) - Mozilla

File Edit View Go Bookmarks Tools Window Help

Your Institution UNIVERSITY Home Help Logout Developer Copy

My Institution Courses Community Services

COURSES > Math 106 - Fall 2003 > CONTROL PANEL > ASSIGNMENT EDITOR > SELECT QUESTIONS

Assignment Editor

CHOOSE NAME SELECT QUESTIONS SET POLICIES REVIEW & FINISH

Question Bank: -- Select Question Bank --

Add as Items Add as Group

Delete Move Up Move Down Merge

No question bank selected yet.
Select a question bank from the menu above to start.

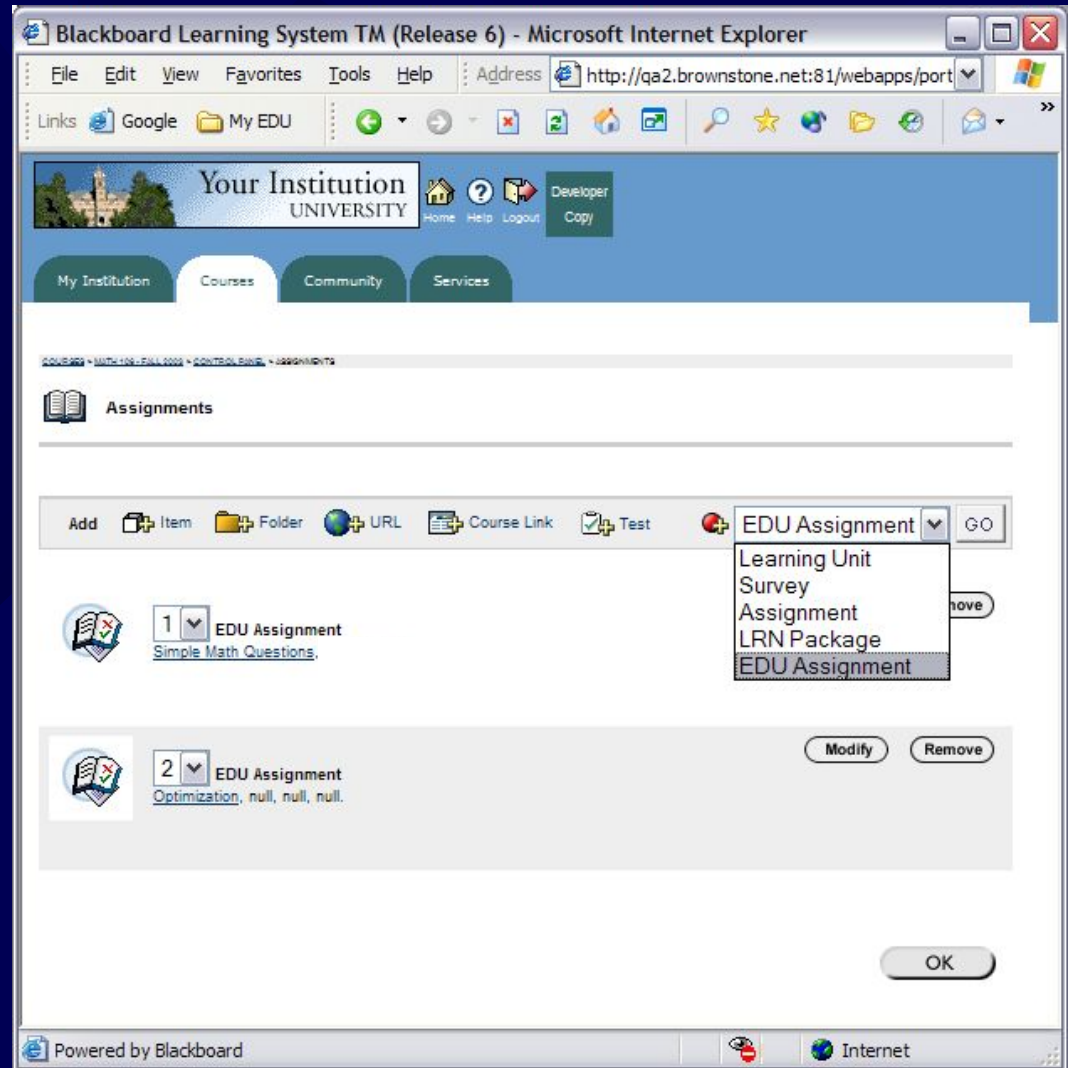
No questions have been chosen yet.

<< Back Help

Done

The EDU software > EDU and Blackboard Blackboard Plugin

Place EDU
assignments
in any Bb
content area



The screenshot shows a Microsoft Internet Explorer browser window displaying the Blackboard Learning System (Release 6) interface. The address bar shows the URL: <http://qa2.brownstone.net:81/webapps/port>. The page header includes "Your Institution UNIVERSITY" and navigation links for Home, Help, Logout, and Developer Copy. Below the header, there are tabs for My Institution, Courses, Community, and Services. The main content area is titled "Assignments" and features a toolbar with options: Add, Item, Folder, URL, Course Link, Test, and EDU Assignment. A dropdown menu is open under the "EDU Assignment" button, listing options: Learning Unit, Survey, Assignment, LRN Package, and EDU Assignment. Below the toolbar, there are two existing assignments listed:

- 1 EDU Assignment: Simple Math Questions.
- 2 EDU Assignment: Optimization, null, null, null.

Buttons for "Modify" and "Remove" are visible next to the second assignment. An "OK" button is located at the bottom right of the content area. The footer of the browser window shows "Powered by Blackboard" and "Internet".

The EDU software > EDU and Blackboard Blackboard Plugin

EDU grades appear in Bb grade book

The screenshot shows a Mozilla browser window titled "Blackboard Learning System TM (Release 6) - Mozilla". The address bar contains the URL: `http://qa2.brownstone.net:81/webapps/portal/frameset.jsp?tab=courses&url=`. The page header includes "Your Institution UNIVERSITY" with navigation links for Home, Help, Logout, and Developer Copy. Below the header are tabs for My Institution, Courses, Community, and Services. The breadcrumb trail reads: COURSES > MATH 108 - FALL 2003 > CONTROL PANEL > GRADEBOOK > MODIFY GRADE. The main content area is titled "View Grades" and contains a table with the following data:

Student Name	Item Name	Date	Grade	Points Possible	Class Average	Weight	
Ishie Orr (ishie)	Simple Math Questions (EDU Homework Assignment)	Feb 18, 2004	<input type="text" value="1.0"/>	3.0		0.0	

At the bottom right of the table area are "Cancel" and "Submit" buttons. The browser's status bar at the bottom shows "Done" and various icons.

EDU at Other Schools

- ✦ University of Michigan
- ✦ Florida State University
- ✦ Clemson University

EDU at Other Schools

University of Michigan

- ✦ Gateway Exams
 - ✦ Precalculus, Calculus I and II
- ✦ Proctored on-line exams in labs
- ✦ Practice sessions from home/dorms
- ✦ Passing grade required
- ✦ Value is:
 - ✦ “Immediate feedback”
 - ✦ “Moves work of grading off instructors”



EDU at Other Schools

Florida State University

- ★ 1 practice quiz per week over web...
- ★ ...followed by proctored quiz in lab
- ★ All course assessment done on-line
- ★ Value is
 - ★ “Standardizing precalculus course”
 - ★ “Force the students to work”



EDU at Other Schools

Clemson University

- ✦ Campus-wide use
- ✦ Integrated with campus course management system
- ✦ Hundreds of classes
- ✦ <http://galleon.clemson.edu:8080/classes/>





Grants and Contracts

- ✦ John Wiley & Sons
- ✦ National Science Foundation
- ✦ Brownstone Learning

Grants and Contracts

John Wiley & Sons

- ✦ Product branded as “eGrade”
- ✦ Published this software since 1998
- ✦ Contracts and royalties for over \$74,000
- ✦ <http://www.wiley.com/college/egrade/>

Grants and Contracts

National Science Foundation

- ✦ Assessment of Student Achievement in Undergraduate Education
- ✦ \$493,156 over 3 years
- ✦ Across SMET disciplines
- ✦ Study efficacy of on-line assessment



Grants and Contracts

Brownstone Learning

- ✦ Development and marketing of EDU
- ✦ Contracts for \$331,919 over 2001-04
- ✦ <http://www.brownstone.net/>





EDU and Publishers

“Powered by Brownstone”

- ✦ Wiley - eGrade
- ✦ Prentice Hall - PH GradeAssist
- ✦ W. H. Freeman – ISolve
- ✦ McGraw-Hill – NetGrade/MHBM

EDU and Publishers

Prentice Hall

- ✦ Product branded as “PH GradeAssist”
- ✦ Access to all students buying selected texts
- ✦ <http://www.prenhall.com/phga>

Prentice
Hall



EDU and Publishers

W. H. Freeman

- ✦ Product branded as “ISolve”
- ✦ Available through Freeman website
- ✦ Structured problems in physics
- ✦ <http://www.whfreeman.com>

EDU and Publishers

McGraw-Hill

The screenshot shows a web browser window titled "McGraw Hill Homework Manager - Microsoft Internet Explorer". The address bar contains the URL "http://borderline.programmingart.com:8084/classes/mhbm/". The browser's menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". The toolbar contains icons for "Back", "Forward", "Home", "Search", "Favorites", "Media", and "Print".

The main content area has a blue background. At the top left is the "MHM" logo with a hand cursor icon. To its right is the text "McGraw-Hill's Homework Manager Class Homepage". At the top right is the "McGraw Hill" logo. Below the logo is the text "Please bookmark this page, it will be your starting point for all activity in this class." and a horizontal banner with the word "online".

The page is divided into two main columns. The left column is titled "Student Menu" and contains the following elements:

- Select an option below:**
- [Register for this class](#)
- Select an assignment:**
- A text input field containing "Test Assignment" and "An assignment" below it.
- A "Go" button.
- [View past results or change password](#)

The right column contains the following elements:

- Class**
- [McGraw Hill Homework Manager](#)
- [Not the correct class? Click here](#)
- Instructor**
- [Test P Teacher](#)

At the bottom of the right column is a box titled "Proctors & Instructors" containing:

- [Instructor Login](#)
- [Proctor Login](#)

At the bottom left of the page is the text "powered by BROWNSTONE". The browser's status bar at the bottom shows "Done" and "Internet".

EDU and Other Companies

Maplesoft

- ✦ Product branded as Maple T.A.
- ✦ Integrated with powerful Maple scientific computing platform
- ✦ Marketed to Math Departments
- ✦ <http://www.mapleta.com/>



EDU and Other Companies

Blackboard

- ★ Brownstone is a Blackboard Building Blocks Partner
- ★ EDU can be used transparently within Blackboard
- ★ <http://demo.brownstone.net/>

