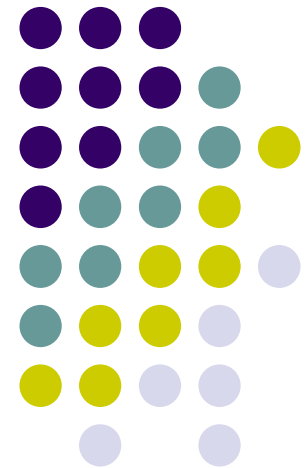


Panel Discussion on Assessment

John Lindsay Orr
University of Nebraska - Lincoln



Background in On-Line Hwk



- [1994] Calculus reform project at UNL with CCH materials
- [1996] Began **Gateway Exams** in calculus at UNL
- [1997 – 99] Expanded to on-line homework & more courses
- [1997 – 2000] Developed **Wiley Webtests** and **eGrade 1.0** for John Wiley & Sons
- [2001 – 05] Developed **EDU** for Brownstone Learning (now Horizon Wimba)
- [2003 – 07] System became core of Maplesoft's **MapleTA**

On-Line Hwk/Learning



What is an

Online Assessment Management System

and ***why*** use it?

What is an OAMS?



It's web-based software for:

Student: Step through questions, answer them, get grade report and feedback

Instructor: Write questions, assemble assignments, review grades

Varied question types and assignment types

Examples



Some Online Assessment Management Systems include:

- **WebAssign** from North Carolina State U
- **WebWork** from Rochester U

- Wiley's **WileyPlus**
- Pearson's **MyMathLab**

- Maplesoft's **MapleTA**
- Horizon Wimba's **EDU**

- Component of CMS e.g. **Blackboard, Moodle, etc**

Core Features



The core features of an OAMS are:

- Automated grading, immediate feedback
- A range of question types; algorithmic questions
- Range of assignment policies
- Grade reporting for student and instructor
- Tools to create new questions
- Administrative tools
- Interface with other web applications (CMS)

The Class We Wish We Had



Five Practical Problems



1. Students don't always remember all the material from previous courses.
2. Some students scrape through on partial credit who shouldn't.
3. There are some students in my class who shouldn't be there.
4. I know what I said but I don't know what they heard.
5. My students don't all study as hard as I'd like them to.

How Technology Can Help



In addition to

Automated grading and **Immediate feedback**

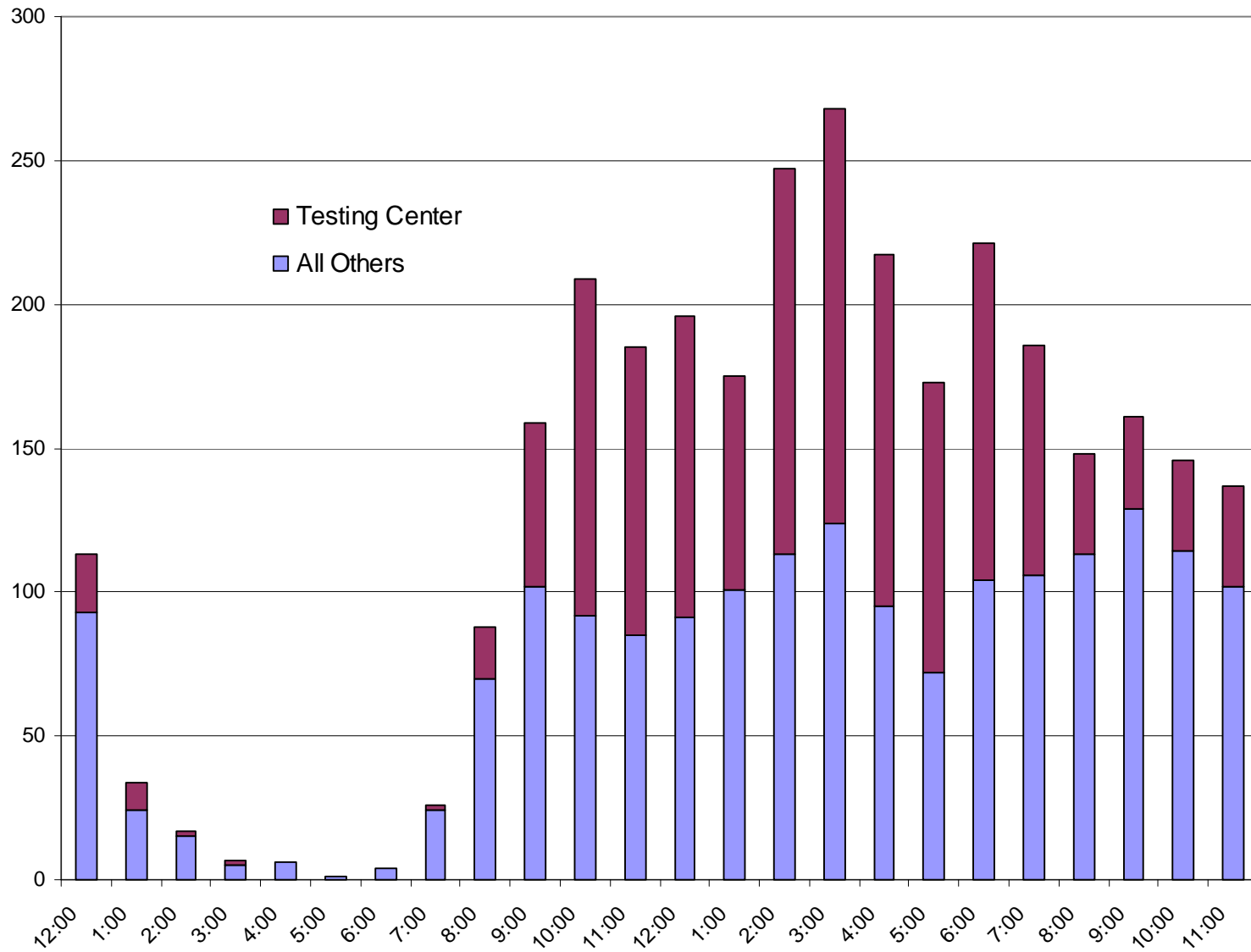
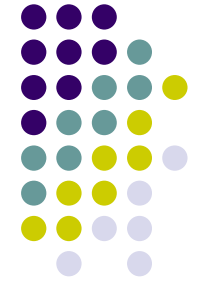
an on-line assessment system provides

24/7 Access

and

Repeatable assignments

I Can Grade in My Sleep



Five Practical Problems



1. Students don't always remember all the material from previous courses.

Practice more the first time. Learn until you've mastered it

Review until you're as good as you were (or better)

2. Some students scrape through on partial credit who shouldn't.

Mastery Learning

3. There are some students in my class who shouldn't be there.

Placement testing

4. I know what I said, but I don't know what they heard.

Diagnostic assessment, pre-flight exercises

5. My students don't all study as hard as I'd like them to.

Increased time-on-task (but, "No pay/no play")

Advantages/Disadvantages



Standardizes courses

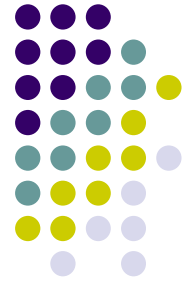
- + Reduces grading work
- + Reduces grading budget
- + Enhances limited classroom time
- Administration
- Question creation

New Trends



- Wi-Fi and prevalence of laptops
- Smart Phones
- Social Networking and Web 2.0
- Personal Response Systems (PRS), aka “Clickers”

New Trends/New Directions



- Student-to-student communication:
 - Peer-grading, peer comments, peer comparison
 - Sharing questions with friends, maintain library
 - Integration with PRS/clicker system
- Embeddable questions
 - Quick practice questions embedded in pages
 - Content repurposed for hand-held platforms
 - Longer, “question-document” content
- Make use of adaptive learning research

Slides



<http://www.math.unl.edu/~jorr/presentations>

Gateway Exams



Precalculus, Calculus 1, Calculus 2

Require 80% fully correct for credit

Credit is 5% of course total

Daily retakes allowed for two weeks

Proctored exams and unlimited practice

Placement Testing



All incoming students take diagnostic test

Proctored from UNL or high school

Diagnostic assessment algorithm

([Maplesoft + MAA product](#))

Keller Plan



Self-paced introductory psychology course

Students progress through units by mastering tests

Tests mix multiple choice and essay

Both machine and human feedback available

Homework



Increased time-on-task

Publisher and home-grown content

EDU at UNL > Courses



Fall 1996	Spring 1997	Fall 1997	Spring 1998	Fall 1998	Spring 1999	Fall 1999	Spring 2000
Math 106	Math 106 Math 107	Math 103 Math 106 Math 107	EdPs 860 Hist 201 Math 102 Math 103 Math 106 Math 107 Phys 211	Curr 359 EdPs 859 Hist 201 Math 102 Math 103 Math 106 Math 107 Math 208 Phys 211 Phys 211H Psync 296 Psync 350 Psync 461	Chem 110 EdPs 860 Hist 171 Hist 201 Hist 220 Math 102 Math 103 Math 106 Math 107 Math 208 Math 106 Math 107 Math 208 Phys 141 Phys 151 Phys 212H Psync 296 Psync 461	Astr 103 BioSci 230(X) BioSci 301 BioSci 418/818 Chem 109 Chem 110 EdPs 859 Geol 101 Hist 100 Hist 171 Hist 201 Math 102 Math 103 Math 104 Math 106 Math 106H Math 107 Math 203 Math 208 Phys 141 Phys 151 Phys 212 Phys 212H PolS 100 Psync 181 Psync 268 Psync 350 Psync 463 Psync 910 Stat 180 Stat 380 Thtr. Stud.	Astr 103 Bios 202 Chem 109 Chem 110 EdPs 860 Geol 100 Geol 101 Hist 120 Hist 171 Hist 201 Lib 110 Math 102 Math 103 Math 104 Math 106 Math 107 Math 107H Math 203 Math 208 Math 208H Phys 212 Phys 212H Pols 100 Psync 181 Psync 350 Psync 463 Psync 910 Stat 180 Stat 380 Thtr. Stud.

Fall 2003

170 active classes set up

EDU at UNL > Disciplines



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 > Students



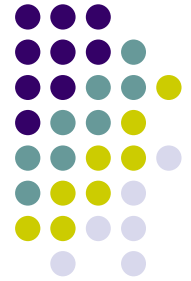
Fall 2003

Student accounts:	10,650
Active (5+ sess.):	7,075

Spring 2004

Student accounts:	8,863
Active (5+ sess.):	5,310

EDU at UNL > Assignments



Fall 2003

Total assignments:	277,148
Daily average:	2,500

Spring 2004

Total assignments:	292,888
Daily average:	2,650

EDU at UNL > Value Added



Fall 2003

Total assignments:	277,148
GTA hourly rate:	\$20
GTA assignments/hour:	10
Cost of human grading:	\$554,296

OAMS for *Math*



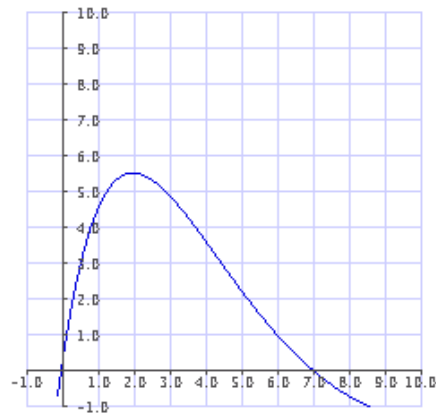
What's specific to math for online assessment?

- Grading formulas and expression on **content**; CAS
 - Powerful question types
- Mathematical **notation** in display and entry
- LaTeX or WYSIWG **question creation**
- Sophisticated algorithms (“ $x+2$ ”)

Algorithmic Questions



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

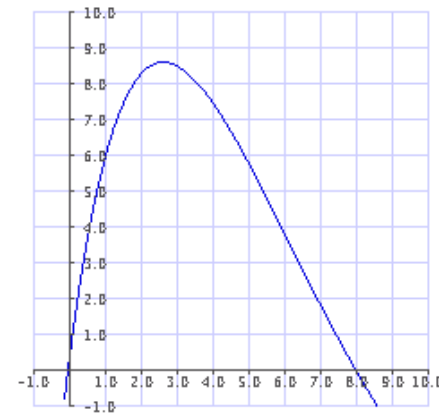


Use Riemann sums on the graph to estimate $\int_0^7 f(x) dx$

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](#)

Questions



A dog is running at 3ft/sec for 20 seconds. How far does it run?

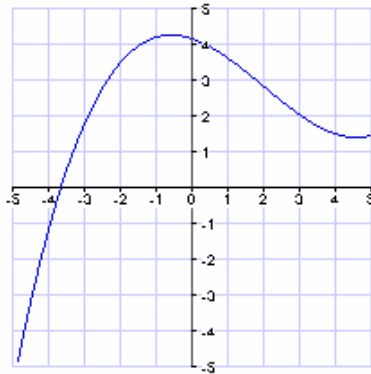
Number

Units

Questions



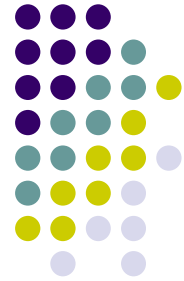
Mark all those statements that are true for the function f whose graph is depicted below.



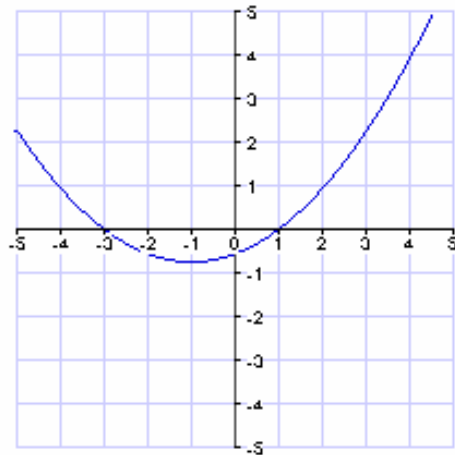
- f'' is negative at $x = 0$
- f' is positive at $x = -4$
- f is increasing at $x = 0$
- f' is negative at $x = -2$
- f' is decreasing at $x = -2$

[Partial Grading Explained](#)

Questions



Use the graph of f' shown below to determine the local extrema of f .



Find the local **maxima** of f .

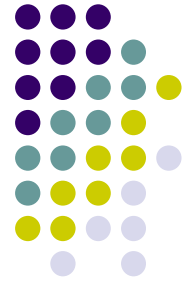


Find the local **minima** of f .



[If there is more than one answer, separate them with semicolons.
If there are no answers, enter "-10".]

Questions

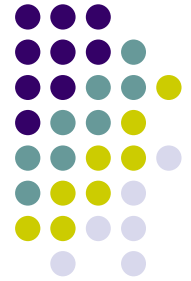


Find the derivative of $(7v^3 - v)(\cos(5v))$.

This question accepts numbers or formulas.

[Help](#) | [Change Entry Style](#) | [Preview](#)

Questions

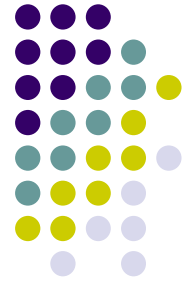


Compute $\int \frac{e^x}{\sqrt{3-6e^x}} dx$.

This question accepts numbers or formulas. Do not include a constant of integration in your answer.

[Help](#) | [Change Entry Style](#) | [Preview](#)

Questions



Give an example of a function $f(x)$ which is increasing on the interval $[0, 10]$. Enter only the expression for the function, omitting " $f(x) =$ ". Click Plot to verify that your function increases.

Equation Editor [Help](#)

$x^2 + \sqrt{x+1} +$

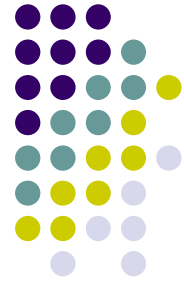
$\frac{a^b}{a}$ $\sin(a)$ ∞ α, π

$\frac{a}{b}$ a^b \sqrt{a} $\sqrt[n]{a}$ $|a|$

This question accepts numbers or formulas.

[Plot](#) | [Help](#) | [Change Math Entry Mode](#)

Questions



Question:

This question concerns the integral of the function x^{11} .

(a)

In the first part, use a geometric argument to decide whether $\int_{-7}^7 x^{11} dx$ is:

- negative
- zero
- positive

(b)

In the second part, check your response by computing the integral.

(i) Evaluate $\int x^{11} dx$.

This question accepts numbers or formulas.

[Help](#) | [Change Entry Style](#) | [Preview](#)

(ii)

Use the indefinite integral above to compute $\int_{-7}^7 x^{11} dx$

This question accepts numbers or formulas.

[Help](#) | [Change Entry Style](#) | [Preview](#)

(c)

The geometric argument in the first part was based on the fact that x^{11} is an function.

Questions



Find the closest point on the curve $f(x) = x^2 + 17$ to the point $(-37, 0)$.

(Note: you must get all parts right to get credit for this question.)

(i) Find a formula for distance squared between the indicated point and an arbitrary point on the curve.

This question accepts numbers or formulas.

[Help](#) | [Change Entry Style](#) | [Preview](#)

(ii) Why can we find the minimum of the distance squared instead of just the distance?

- In case the distance is negative, we will still get the correct answer because it is squared.
- A larger d^2 means a larger d whenever d is positive.
- Distance squared is simpler than just the distance.
- We want to avoid the square root when using distance.

(iii) Let $g(x)$ be the function that gives the distance squared. Find the derivative of $g(x)$.

This question accepts numbers or formulas.

[Help](#) | [Change Entry Style](#) | [Preview](#)

(iv) Find the critical number(s).

This question accepts numbers or formulas.

[Help](#) | [Change Entry Style](#) | [Preview](#)

(v) How do we know without additional calculation that the critical point is a minimum?

- It has to be a minimum otherwise this problem wouldn't work.
- $g(x)$ is continuous and increases as $x \rightarrow \infty$ and $x \rightarrow -\infty$.
- $g(x)$ is not continuous but increases as $x \rightarrow \infty$ and $x \rightarrow -\infty$.
- $g'(x)$ is continuous and is always increasing.

(vi) What are the coordinates of the point on the curve closest to the given point?

This question accepts answers that are in a form like $(-1,3)$ or $(3,7,3z)$.

The entries can be numbers or formulas.

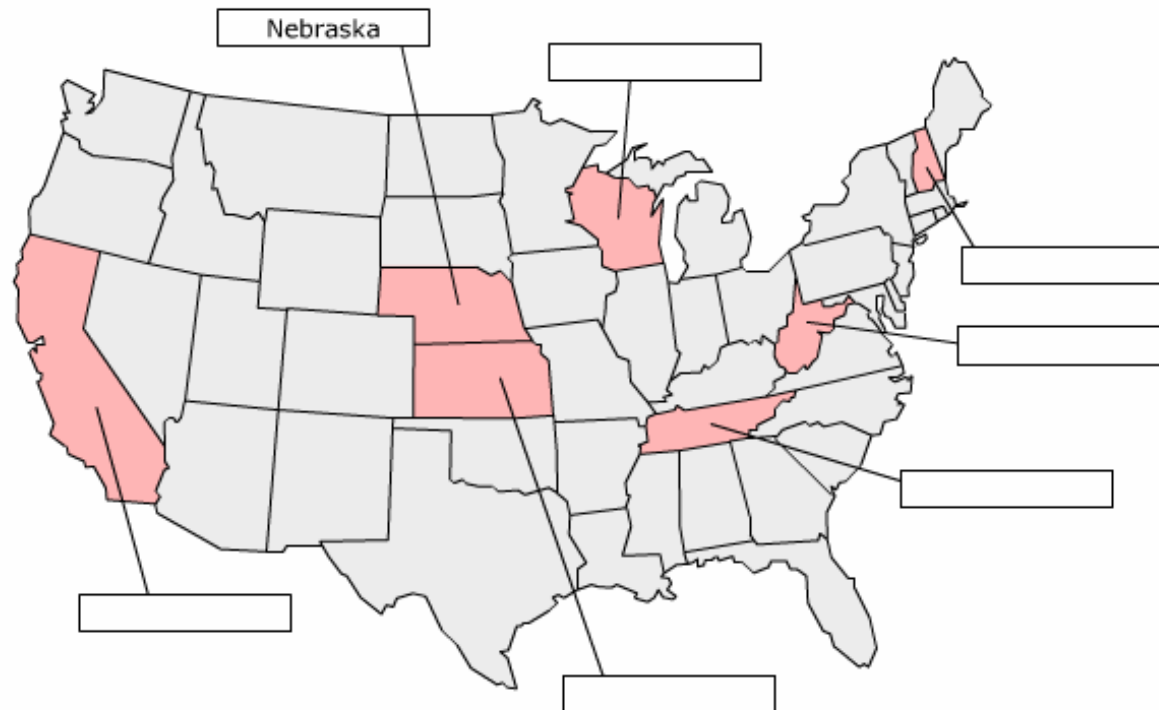
[Help](#) | [Preview](#)

Questions

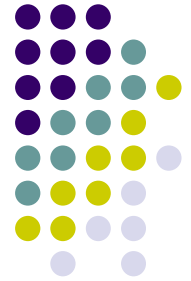


Question 10: (1 point)

Identify the states in the diagram below.



Questions



Question 7: (1 point)

Directions: Put the phases of the moon in **reverse chronological** order, from **latest** to **earliest**, starting with **new moon**.



[Click here for background information on this problem](#)



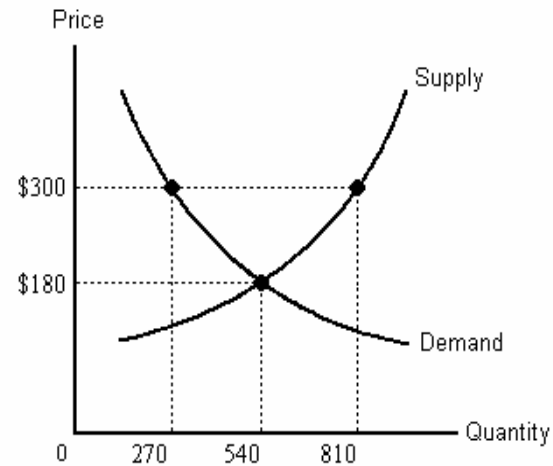
Grading Info

Questions



Question:

Assume that the equilibrium price of corn is \$180 as shown in the graph below.



- (a) If a law is passed that forces the sales price of corn to be \$300, how many units will be sold?
- (b) What will be the total revenue generated by the sale of corn after the price increase? Do not include the dollar sign (\$) in your response.

(a)

[Preview](#)

(b)

[Preview](#)

This question accepts numbers and formulas with units.

[Help](#)

Demos



[MapleTA 2.51](#)

[MapleTA 3.0 \(Beta\)](#)

[EDU at UNL](#)