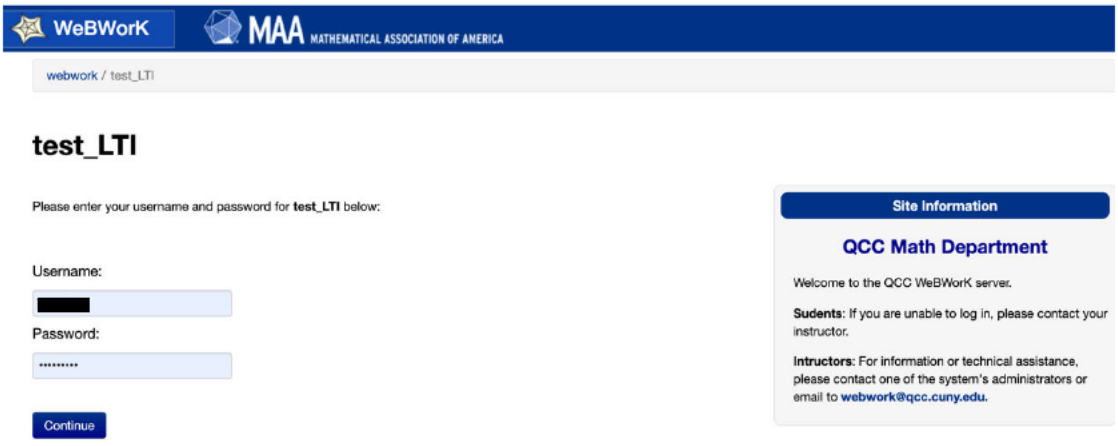
WeBWorK-Blackboard Integration

Blackboard supports a protocol call Learning Tools Interoperability (LTI) that can be used to connect WeBWorK to Blackboard. Basically, you create an "Assignment/Link" providing the url of the WeBWorK course to be connected. The only additional step you need to take in this process is to setup up the grade in Blackboard.

Faculty login and content linking

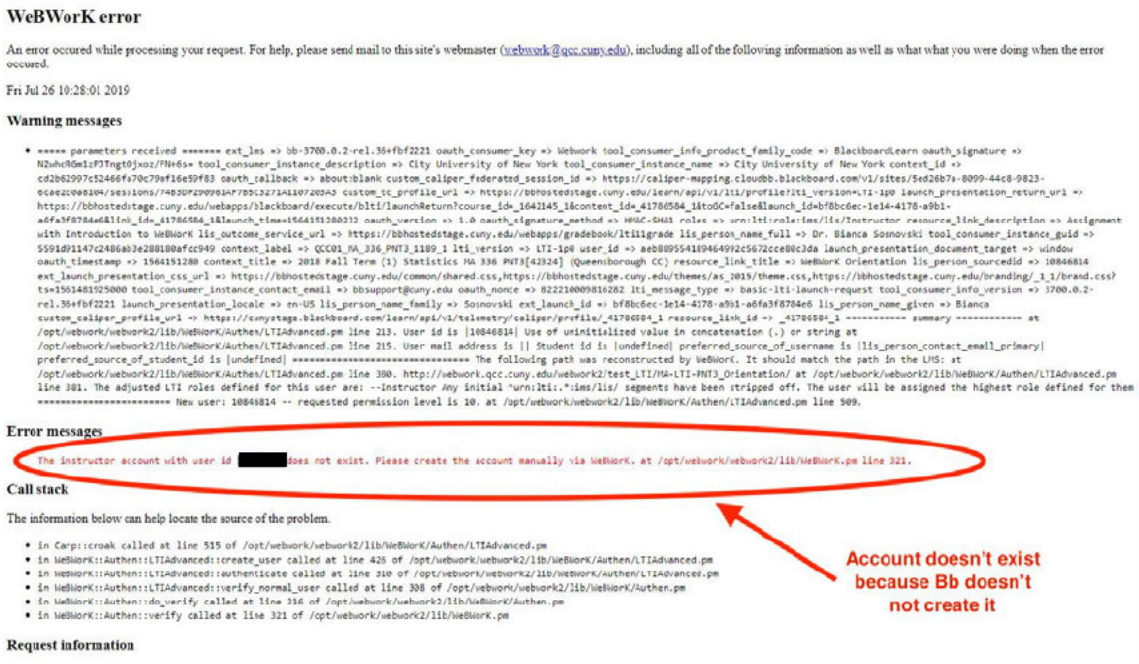
Instructors' login

Instructors, TAs and professors' access and manage their WeBWorK courses in the usual way as before the WeBWorK-Blackboard integration. That means that they use the WeBWorK front page http://webwork.qcc.cuny.edu/webwork2.



In the LTI's default configuration of WeBWorK, accounts for users with roles of TA or higher are NOT created via Blackboard. That means that the accounts for the instructors are created manually in WeBWorK by the system's administrators as it has been done since the system was implemented at QCC.

Instructors, professors and TAs cannot access WeBWorK via Blackboard. If a user in one of these roles attempts to login into WeBWorK via Blackboard, the following error message appears.



If an instructor uses the "Student Preview" mode in Blackboard, then a student account can be created in WeBWorK and they will be allowed to login to WeBWorK via Blackboard as any student would.

For security reasons, the cut off at the TA level for creation of LTI based accounts is to prevent instructors with LMS access to point to an existing WeBWorK URL to any other course. Thus, able to add themselves (and potentially their students) to somebody else's course. With the default cut off to TA, the worst case is that an unauthorized student webwork account gets created for the course by a faculty using "Student Preview".

Content linking in Blackboard

1) Enable LTI in Blackboard

In the Blackboard menu under "Customization" click on "Tool Availability". Scroll down and make sure the box in the **QCC WeBWorK** row (in the "Available" column) is checked.

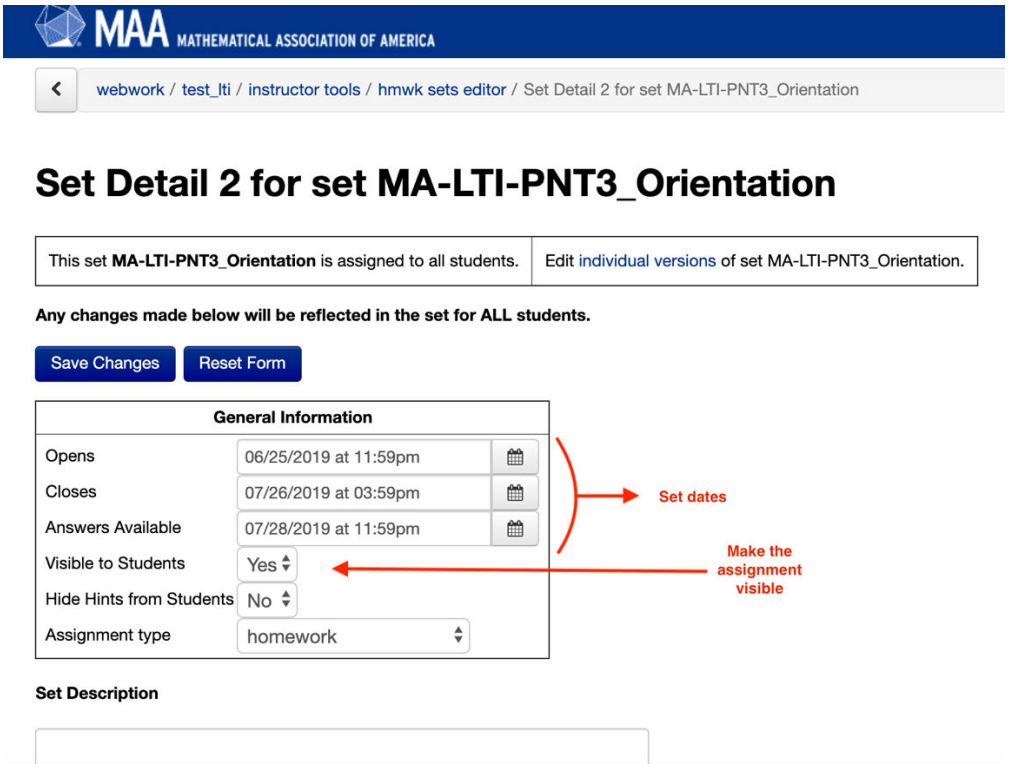
2) Create an assignment

Instructors create assignments in WeBWorK as usual. For more information about this, check https://github.com/bsosnovski/WW-Converter

The necessary steps in creating an assignment in WeBWorK are:

- Name the new assignment (e.g. MA-LTI-PNT3_Orientation).
- Select the questions/problems to be part of the assignment.
- Set dates for when the assignment opens, closes and when the answers will be available.
- Make the assignment visible.

The last two steps are shown below.



3) Linking the assignment in Blackboard

Once the WeBWorK assignment is ready, the instructor will need to make a link/assignment in Blackboard that students can use to get to WeBWorK.

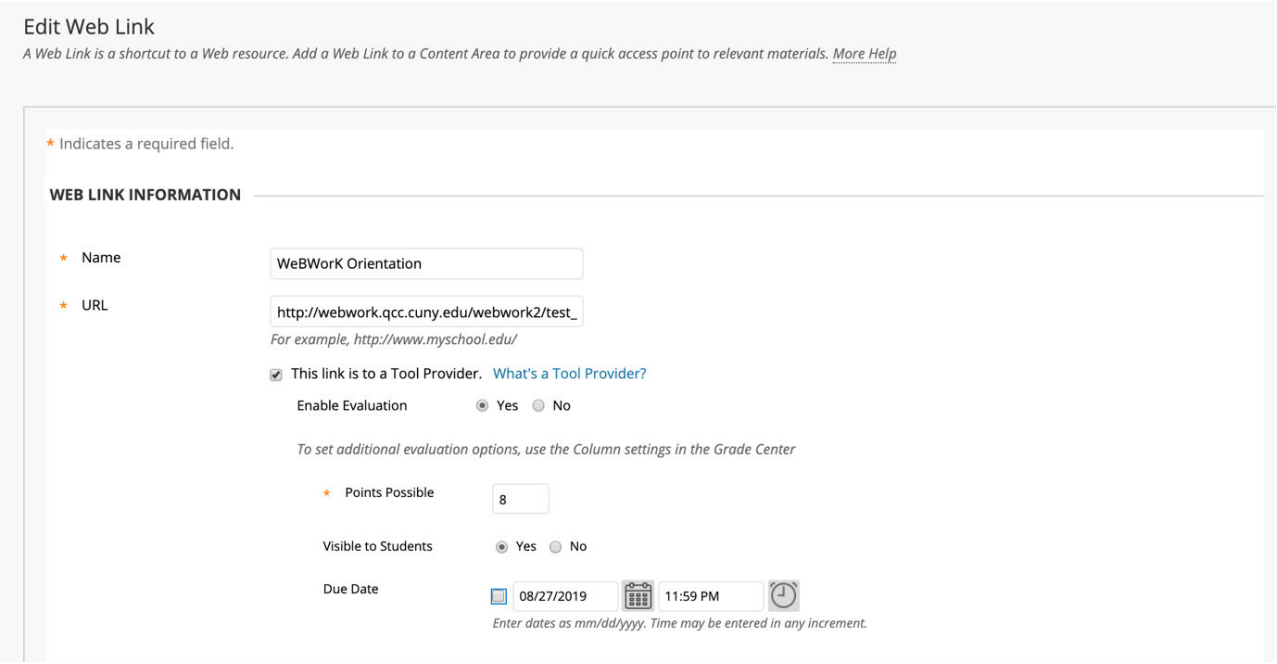
- Go to the content area where you want the assignment link to appear.
- Go Build Content > Web Link.
- Add a name for the assignment.
- Add the URL of the assignment you are linking to. (the URL looks like: **http://webwork.qcc.cuny.edu/webwork2/CourseName/Assignment**)
- Check the box "This link is a Tool Provider".
- Enable Evaluation and make visible to students.
- Set the number of points (same as in WeBWorK)
- (Optional) Set the due date in Blackboard.
- (Recommended) Set the link to open the assignment in a new window.

Example:

A valid link for linking an assignment is like
http://webwork.qcc.cuny.edu/webwork2/test_LTI/MA-LTI-PNT3_Orientation

Note:

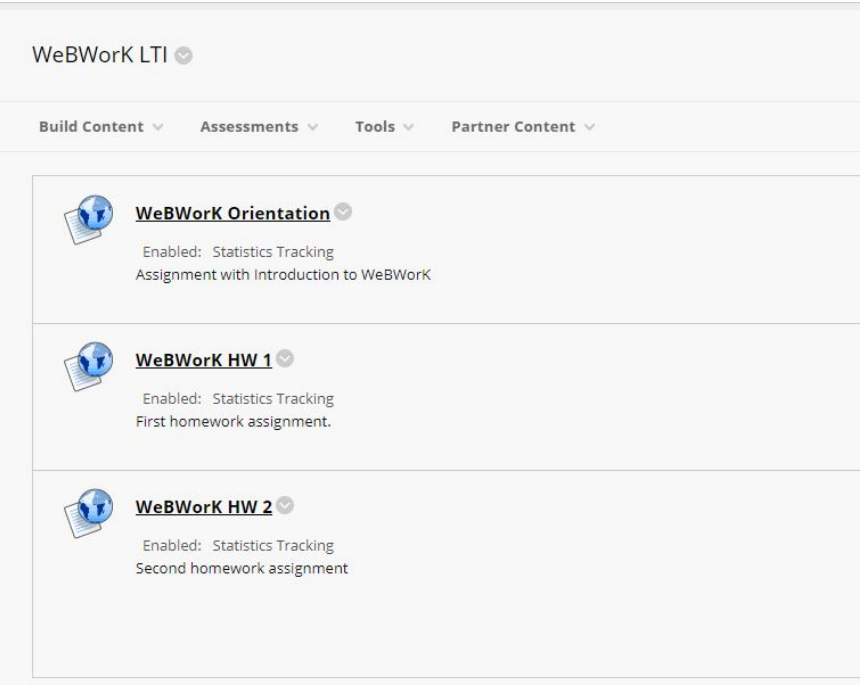
Visibility and due dates of assignments are not automatically synchronized. Changing theses in WeBWorK doesn't change them automatically in Blackboard. Though instructors have to set these features in both systems separately, it is recommended that instructors to set due dates also in Blackboard and to allow WeBWorK to control the availability of the assignments.



Now everything is set up and ready for the students.

Note: You need to make sure grading is enabled for the link and set the total number of points the assignment is work.
It is recommended that you use 100 points so that the grade looks like a percentage. However, the grade given to the student will always be a percentage of the total available points so you can use however many points you want.

The following shows the assignments links created in the content area called “WeBWorK LTI.”

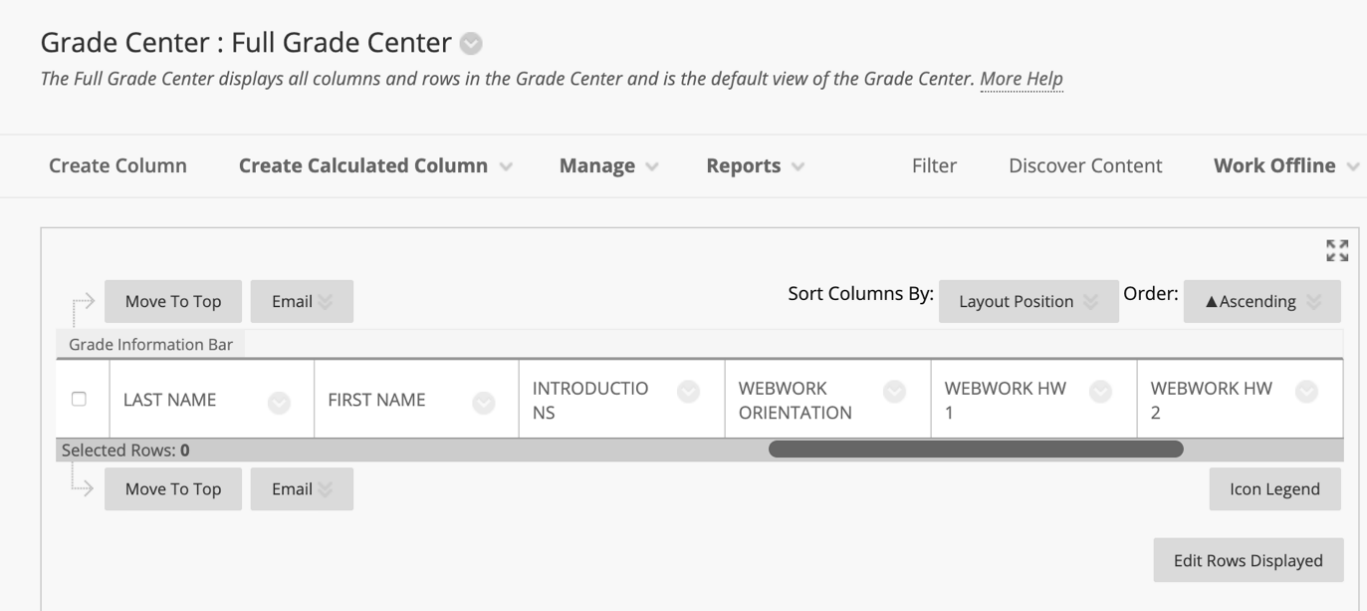


Grade sync

The LTI configuration in WeBWorK is set to return the total score for each assignment to Blackboard. In other words, instructors will see multiple columns in Blackboard Grade Center, one for each link/assignment, which will be filled out with the students' scores on individual WeBWorK assignment.

WeBWorK will attempt to update student grades every time they submit an answer to a problem. This keeps the student grades current. One possible downside of this feature is that it can drain our QCC WeBWorK server.

Below is an illustration of the corresponding columns created in the Grade Center based on the assignments shown above. These columns will be filled with scores as students access the assignments using the links provides in Blackboard.



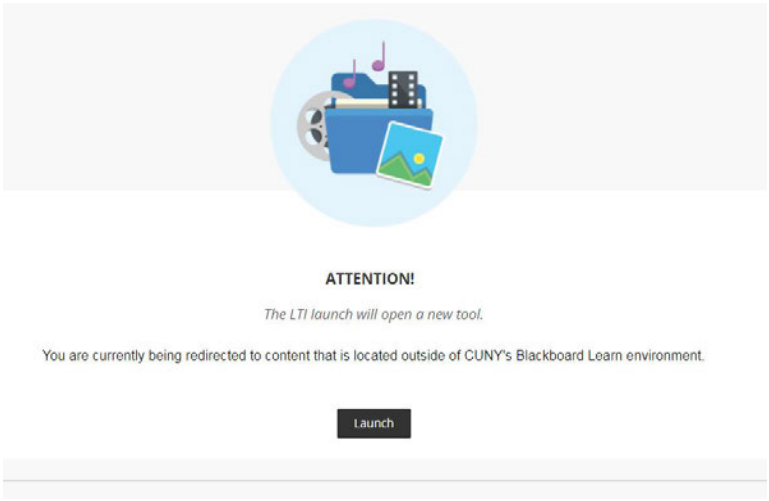
Testing the system as a student

Students' login

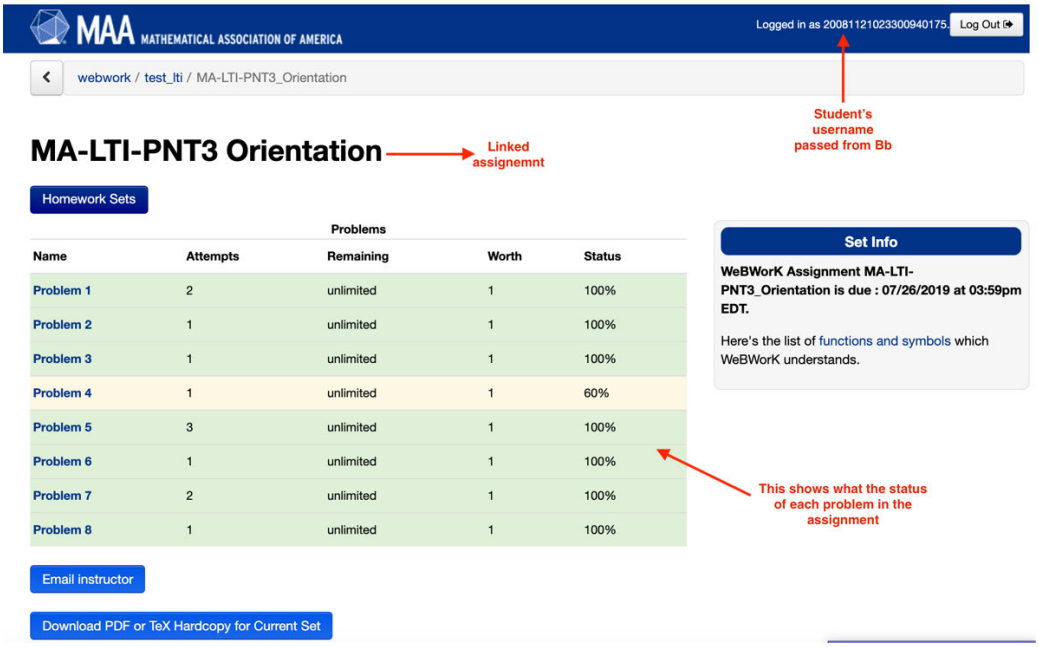
With the WeBWorK-Blackboard integration via LTI, Blackboard automatically creates students accounts in WeBWorK. A password will not be required from the students to access WeBWorK. Students are automatically assigned to all visible homework sets.

Students' accounts created via Blackboard will not have neither a student ID nor an initial password in WeBWorK. Students will not be able to login into WeBWorK directly. There is only one way for students to login. They must log in to Blackboard and select a WeBWorK assignment.

Students see the link(s) to their WeBWorK assignment(s) in the Content area in Blackboard. They will use the link(s) to access WeBWorK assignment(s). Once students click on a link, they receive a notification that they will be redirected to an application outside Blackboard.



The screenshot below shows what a student see after there are logged in to WeBWorK.



The login was successfully done via Blackboard and the student is able to submit answers to the assignment before or on the due date.

Through a customization of WeBWorK's configuration, section and semester/year that are passed to WeBWorK as well. The information helps to facilitate instructors' management of their course accounts in system.

Once in WeBWorK students navigate and finish assignments in exactly the same way they normally would. WeBWorK behaves just as it would if there were no connection to Blackboard at all. The only difference is when students submit a grade, they should get a message like the one below about the status of the submission.

MA-LTI-PNT3 HW 1: Problem 12

Previous Problem | Problem List | Next Problem

Results for this submission

Entered	Answer Preview	Result
3	3	correct
y-3*x = 0	$y-3x=0$	correct

All of the answers above are correct.

(1 point) Find the slope and the equation for the line passing through the points: $(-1,-3)$ and $(0,0)$.
Note: If the slope does not exist, enter: ***Does not exist***

a) $m =$ 3

b) The equation for the line: y=3x

Note: *You can earn partial credit on this problem.*

Preview My Answers | Submit Answers

I estimate that you answered ~~zero~~ questions incorrectly.
Your score was recorded.Your score was successfully sent to the LMS
You have attempted this problem 3 times.
You received a score of 100% for this attempt.
Your overall recorded score is 100%.
You have unlimited attempts remaining.

From instructors' perspective, WeBWorK's classlist shows the newly student account created with time stamp of the latest grade submission to the LMS, section and semester/year of the course enrollment.

Classlist Editor

Show/Hide Site Description

Select an action to perform:

Filter | Sort | Edit | Password | Import | Export | Add | Delete

Show Which Users?: users who match on selected field

What field should filtered users match on?: Login Name

Filter by what text?:

Take Action!

Showing 11 out of 11 users

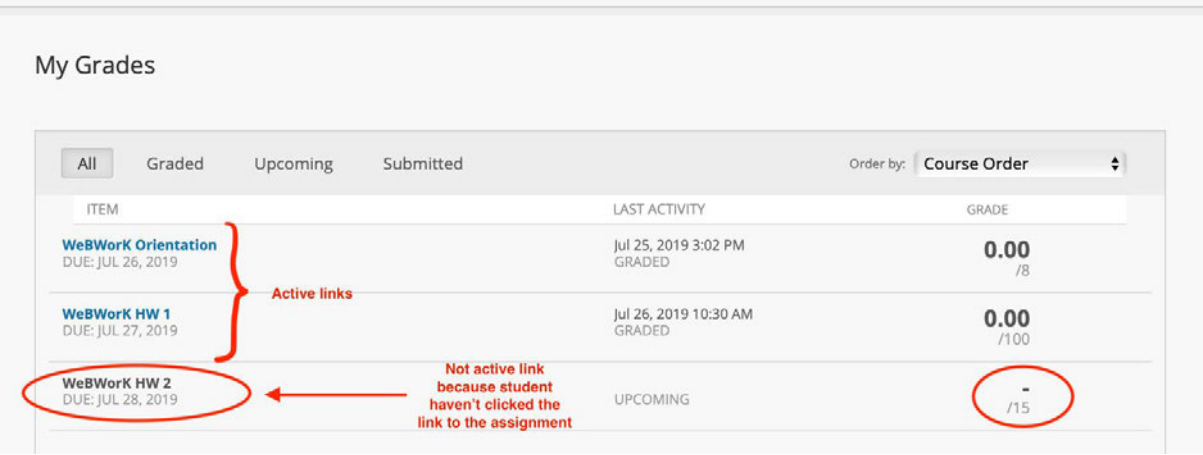
Section and year/ semester are provided in the student's profile

Time stamp updated every time student submit an answer in Ww

Users List

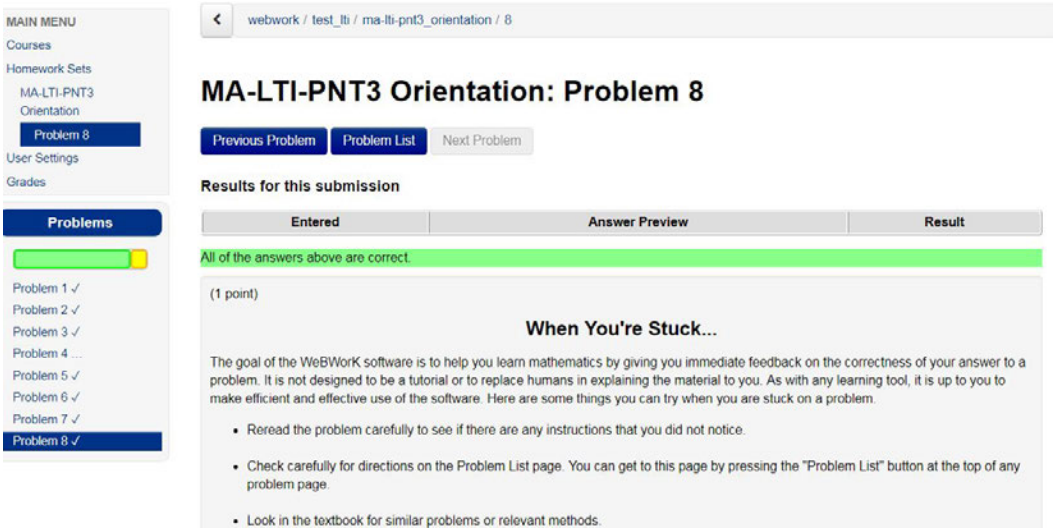
Login Name	Login Status	Assigned Sets	First Name	Last Name	Email Link	Student ID	Status	Section	Recitation	Comment	Permission Level
[redacted]	Inactive	6/7	[redacted]	[redacted]	Email	[redacted]	Enrolled				admin
[redacted]	Active	6/7	[redacted]	[redacted]	Email	[redacted]	Enrolled				admin
[redacted]	Inactive	6/7	[redacted]	[redacted]	Email	[redacted]	Enrolled				admin
[redacted]	Inactive	6/7	[redacted]	[redacted]	Email	[redacted]	Enrolled				admin
[redacted]	Inactive	6/7	[redacted]	[redacted]	Email		Enrolled	Admin			professor
[redacted]	Inactive	7/7	[redacted]	[redacted]	Email		Enrolled	test			professor
[redacted]	Inactive	6/7	Bianca	Sosnovski	Email	[redacted]	Enrolled				professor
[redacted]	Inactive	6/7	Bianca	Sosnovski_PreviewUser			Enrolled			07/26/2019 at 01:18pm EDT	student
[redacted]	Inactive	6/7	test	test	Email	[redacted]	Enrolled	test			student
[redacted]	Inactive	6/7	Qbcc	Testperson			Enrolled	MA 336 PNT3[42324]	2018 Fall	08/01/2019 at 06:44pm EDT	student
[redacted]	Active	6/7	Qbcc	Testperson	Email		Enrolled	MA 336 PNT3[42324]	2018 Fall	08/01/2019 at 06:51pm EDT	student

The following is the student's view in Blackboard's "My grades".



Grade submission

After submitting an assignment, the debugging message in WeBWorK shows that the grade was passed successfully to the LMS.



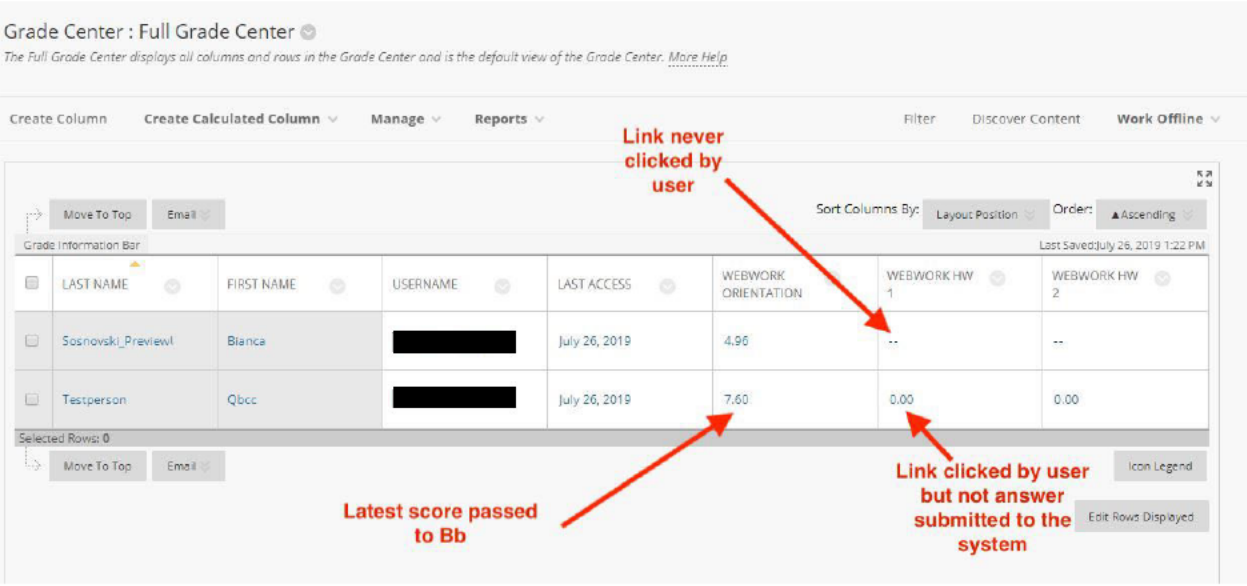
The student sees the following in WeBWork's grades.

Grades

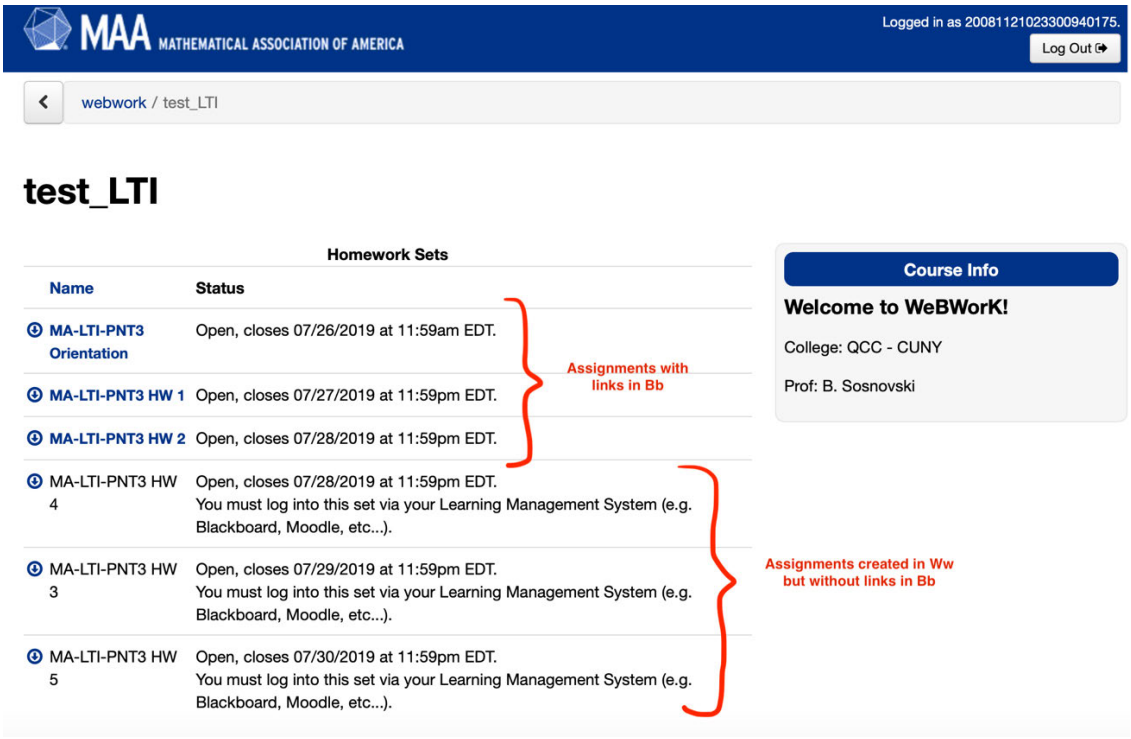
Qbcc Testperson

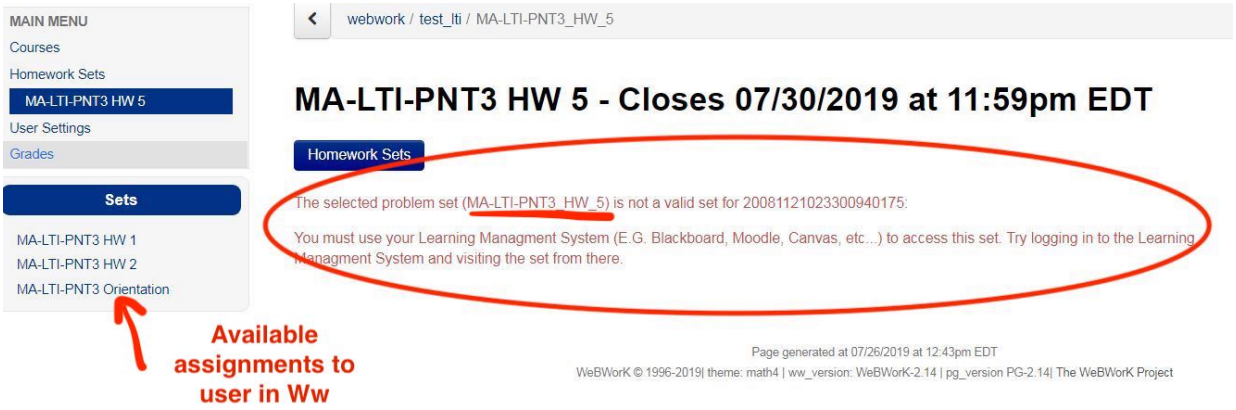
Set	Percent	Score	Out Of	Problems																	
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
MA-LTI-PNT3 HW 1	0%	0.00	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MA-LTI-PNT3 HW 2	0%	0.00	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
MA-LTI-PNT3 HW 3	0%	0.00	13	0	0	0	0	0	0	0	0	0	0	0	0	0					
MA-LTI-PNT3 HW 4	0%	0.00	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MA-LTI-PNT3 HW 5	0%	0.00	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
MA-LTI-PNT3 Orientation	95%	7.60	8	100 0	100 0	100 0	60 1	100 2	100 0	100 1	100 0										
Homework Totals	9%	7.6	89																		

And faculty sees the following in Blackboard's Grade Center.



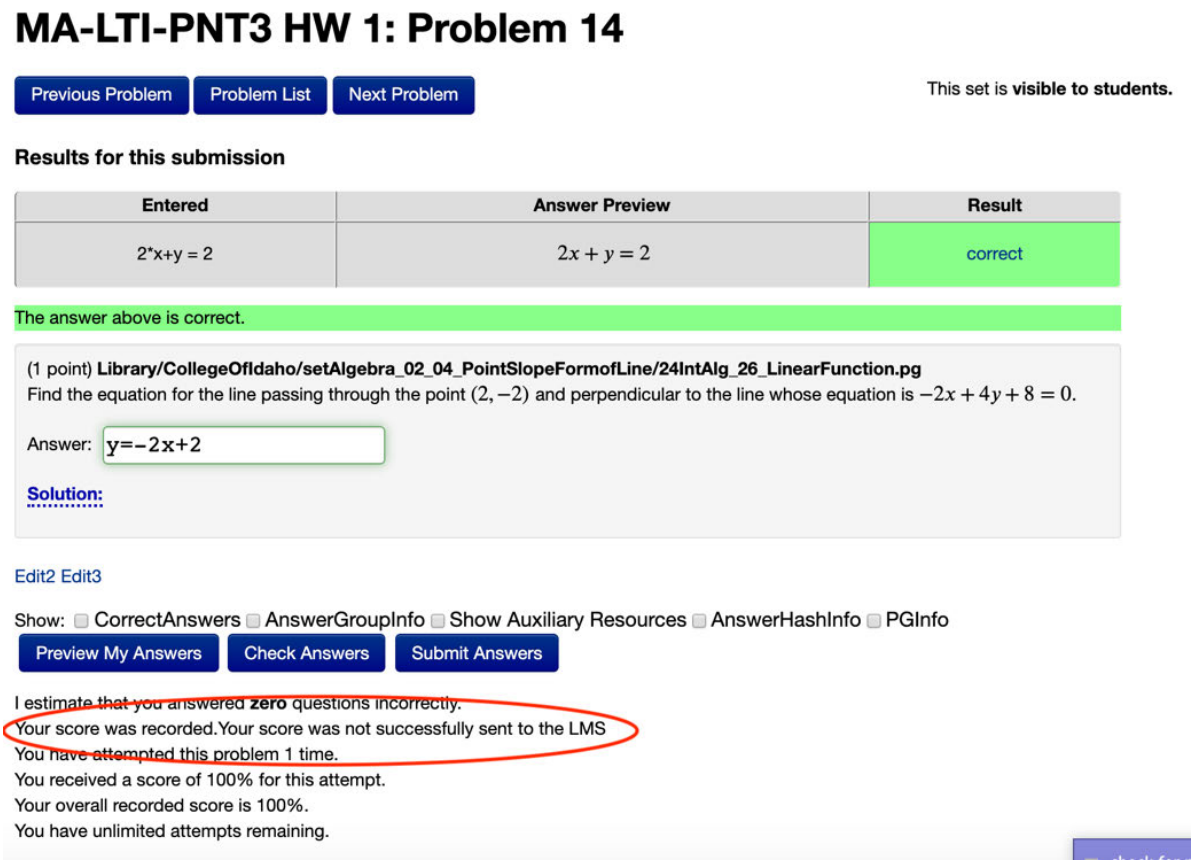
If assignments are made visible in WeBWorK but are without links in Blackboard or their links were never used by the user, students will be able to see the sets but not access them direct via WeBWorK.





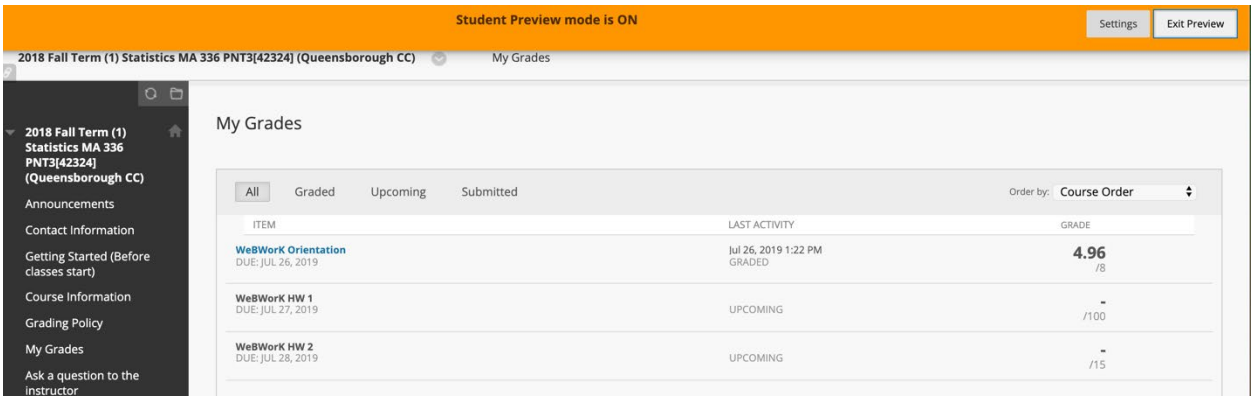
Note:

In Blackboard, instructors do not have grades. In this case they will see the message "Your score was not successfully sent to the LMS". This is OK. The following shows what they see in WeBWorK.



Instructors can switch to the "Student Preview" mode and click on the assignment link. Once the Instructors successfully logged in and see the assignment and try answering some questions, they will see the corresponding scores appear in your student preview account in Blackboard's Grade Center. If any of these steps are unsuccessful, they need to troubleshoot.

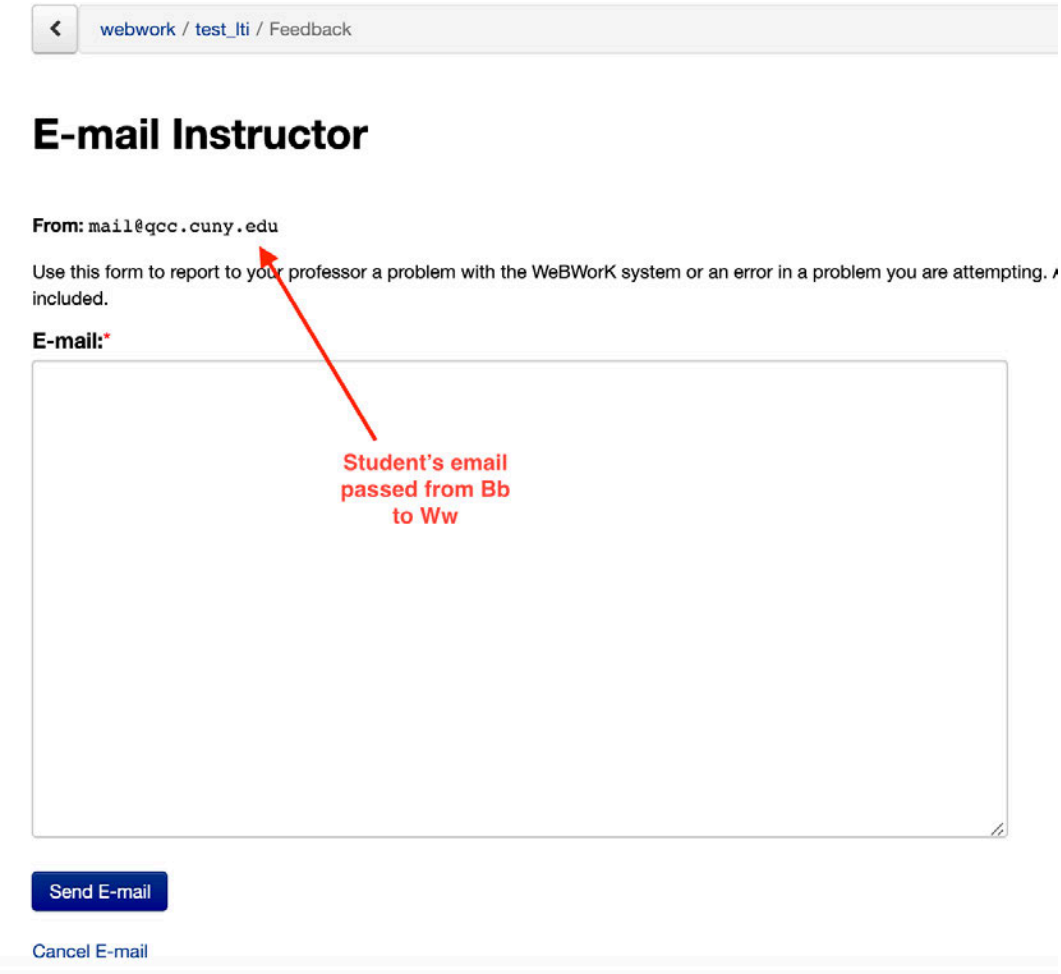
Student preview mode ensures grades are passed back to Blackboard; otherwise, grades are not be passed back. In either case, Blackboard logs you into the same account in WeBWorK.



Other WeBWorK's features:

One of the important features in WeBWorK is the button, Email instructor which students use to communicate with instructors about a specific problem in the assignment posted.

If a student clicks on the button, she/he will be taken to a page where they can type a question that will be sent to your instructor. Then the instructor will receive a link that will take her/him directly to the problem student is working on.



This WeBWorK's feature helps faculty to provide feedbacks to students.

Summary

With the integration, the Department's WeBWorK server allows direct login via Blackboard and it includes:

- Automatic creation of WeBWorK student accounts from Blackboard;
- Single login via Blackboard;
- Automatic grade passback from WeBWorK to Blackboard;
- Assignments are assigned to users once visible.

What remains the same:

- WeBWorK courses are created at the request of course instructors by the department WeBWorK administrators;
- Instructor accounts must be manually created on WeBWorK;
- Assignments are created, opened and closed on WeBWorK.