



Improvement of Student Learning by Automatic Grading Systems: Mechanics, Feedback, Limitations, Recommendations

Matthias K. Gobbert, www.umbc.edu/~gobbert, gobbert@umbc.edu

Department of Mathematics and Statistics, University of Maryland, Baltimore County (UMBC)



Learning by Practice

Textbooks with online testing systems provided by the book publisher offer a number of interesting advantages: (i) homework with multiple number of attempts, (ii) quizzes with different numerical values for each student, (iii) immediate feedback by automatic grading.

With more graded homework and quiz problems with immediate feedback, students practice more and earlier, and thus learn the material better.

Tenet: If students ...

- practice a lot,
- get immediate feedback,
- spend time on task,
- study the textbook,
- communicate more,
- ... they will learn the material and do well in assessments.

Pedagogy of HW vs. Quiz vs. Test

- Homework to motivate review of textbook section and first active use of the material, with immediate feedback and practice for ...
- Quiz on each textbook section after each class meeting and ...
- Tests as whole chapter assessment.

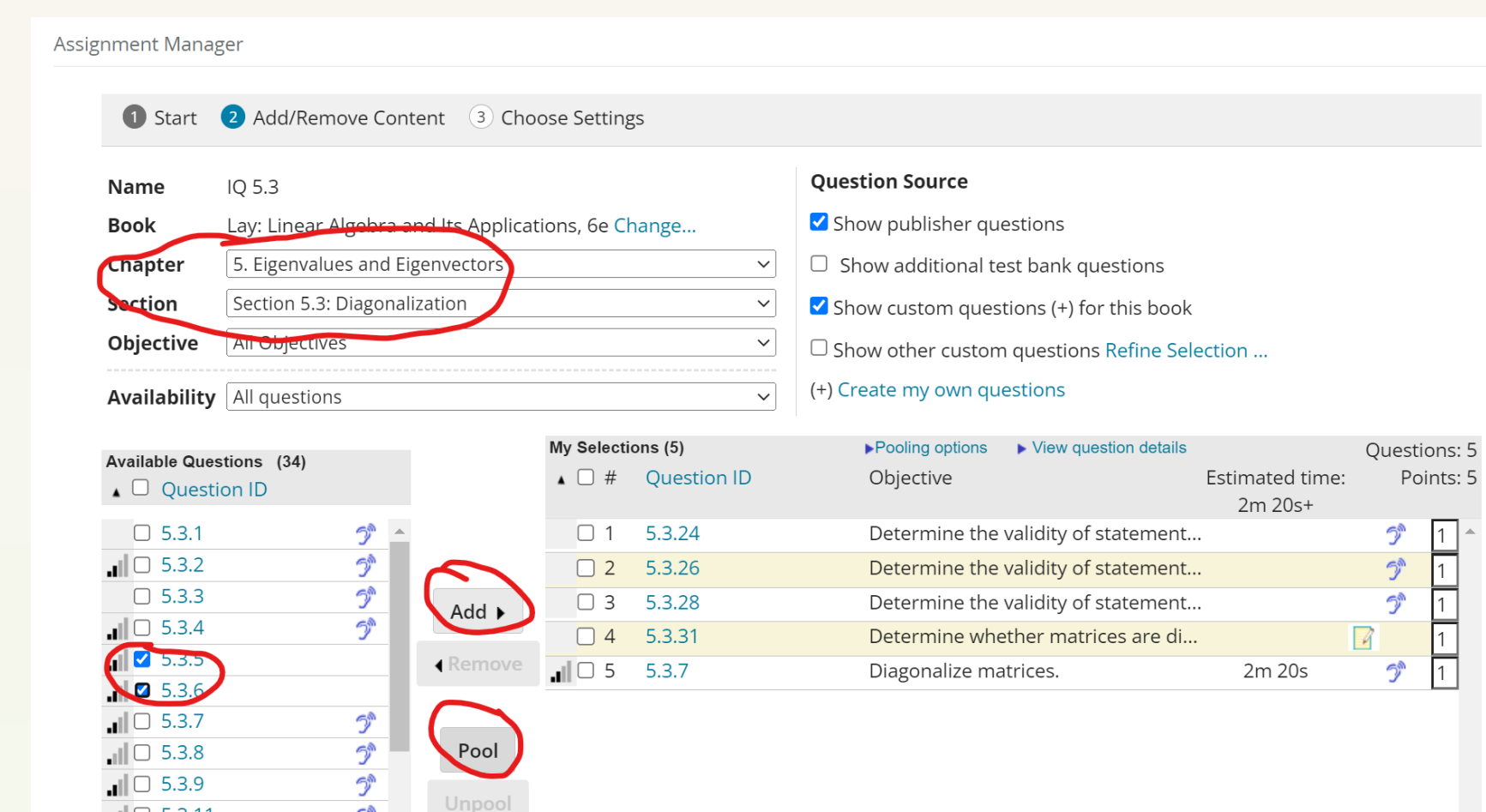
Need to trust the textbook, since the automatic grading system reinforces its presentation and scoring is based on it!

MyLab Assignment Manager

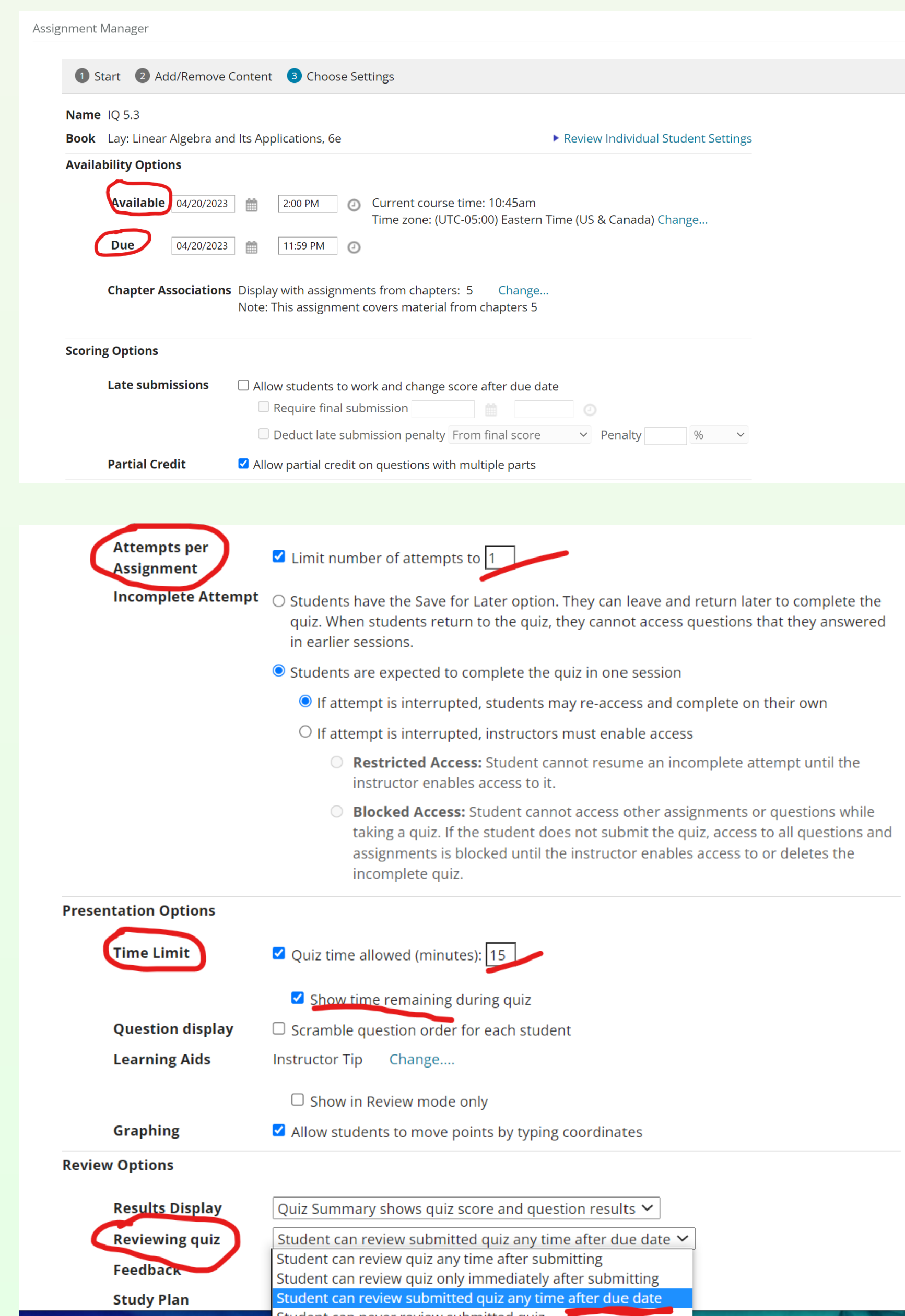
For Math 221 Linear Algebra:

- Text by Lay at al. comes with MyLab by Pearson.
- MyLab synchronizes with Blackboard Gradebook.
- Can be included in the CMI (Course Materials Initiative) upon instructor request.

Assignment Manager: problem selection



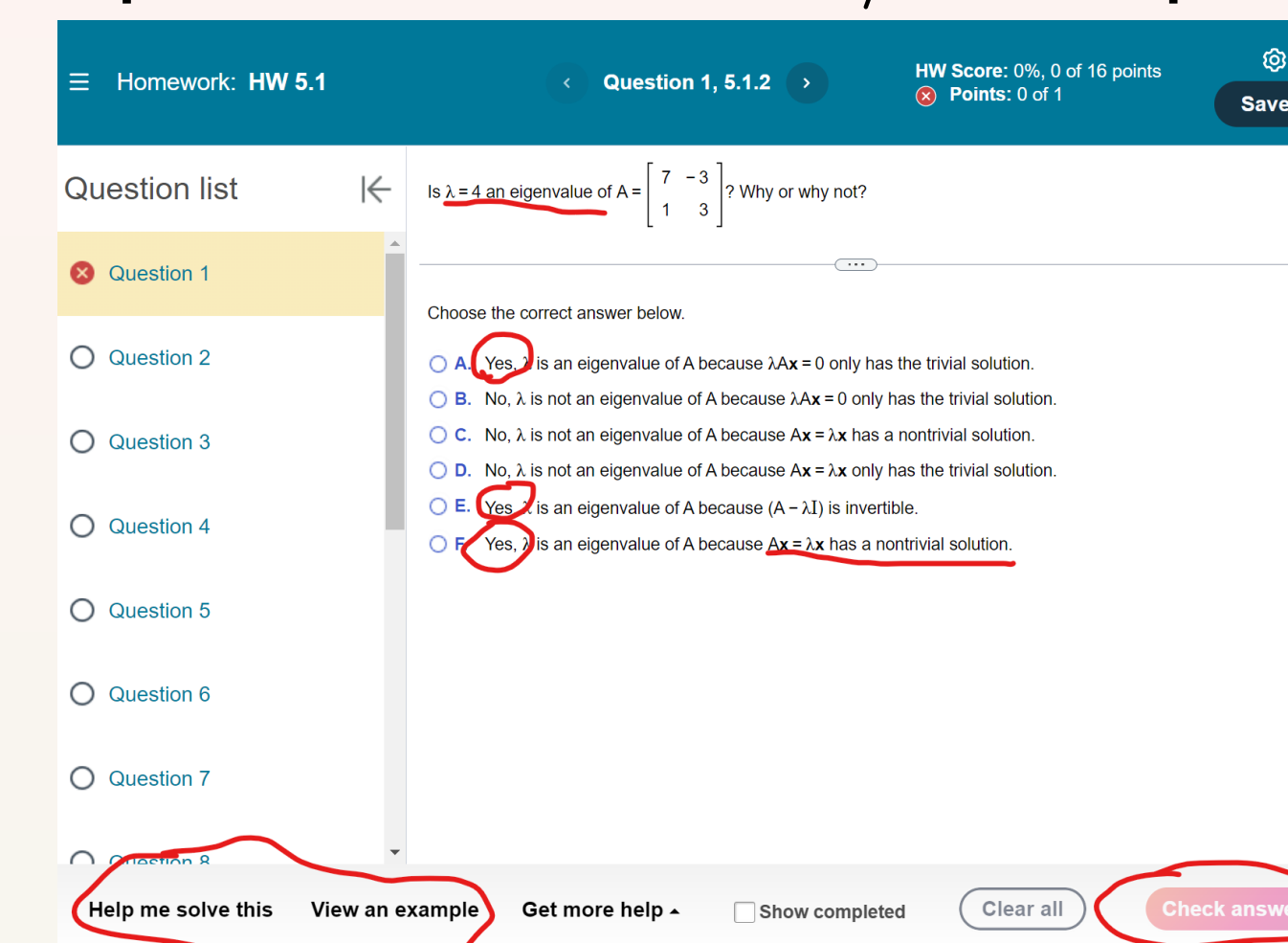
Assignment Manager: settings for a quiz



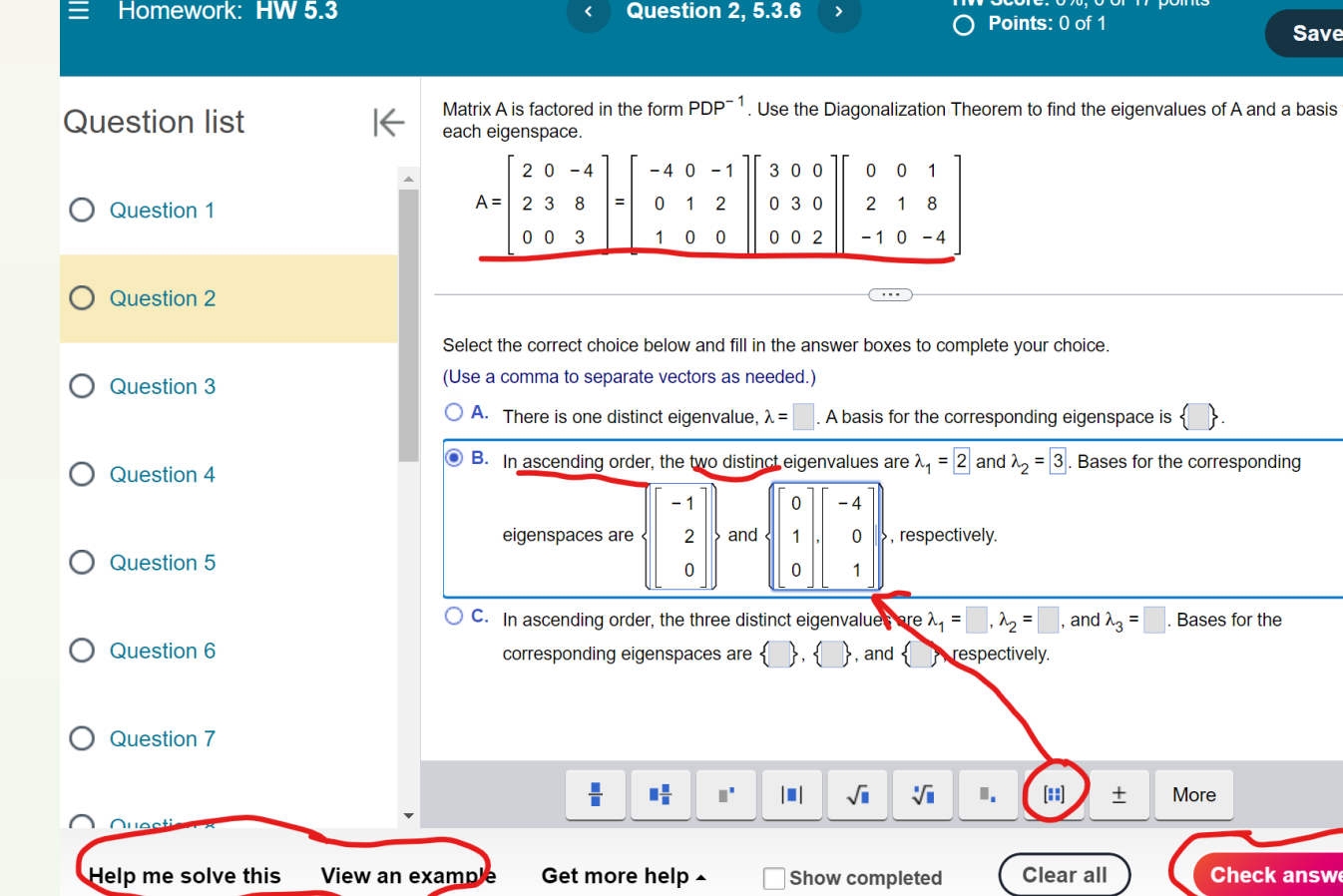
MyLab Homework vs. Quiz/Test

Homework: multiple attempts with hints

Multiple choice or true/false question:

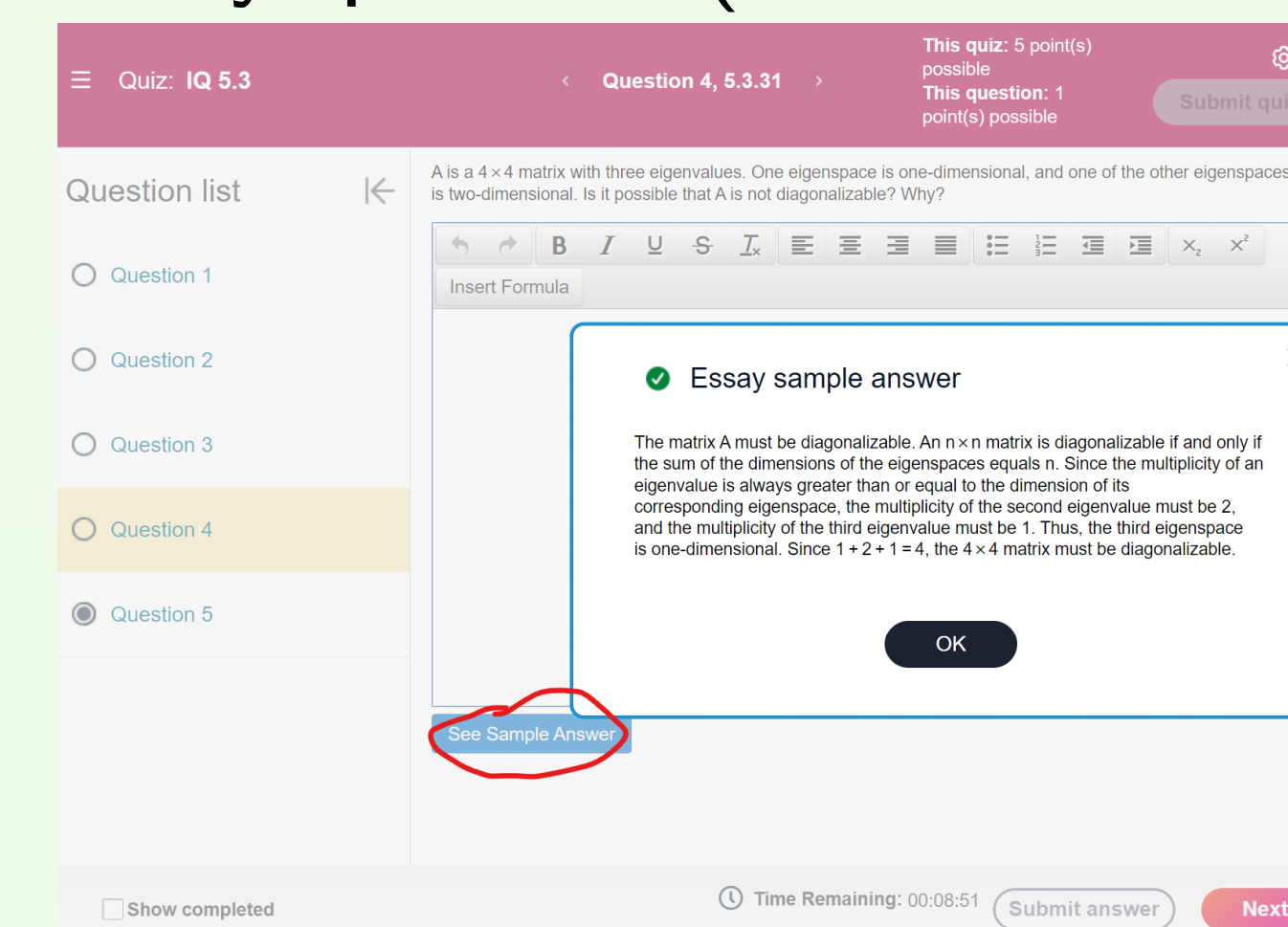


Fill in question with equation editor:

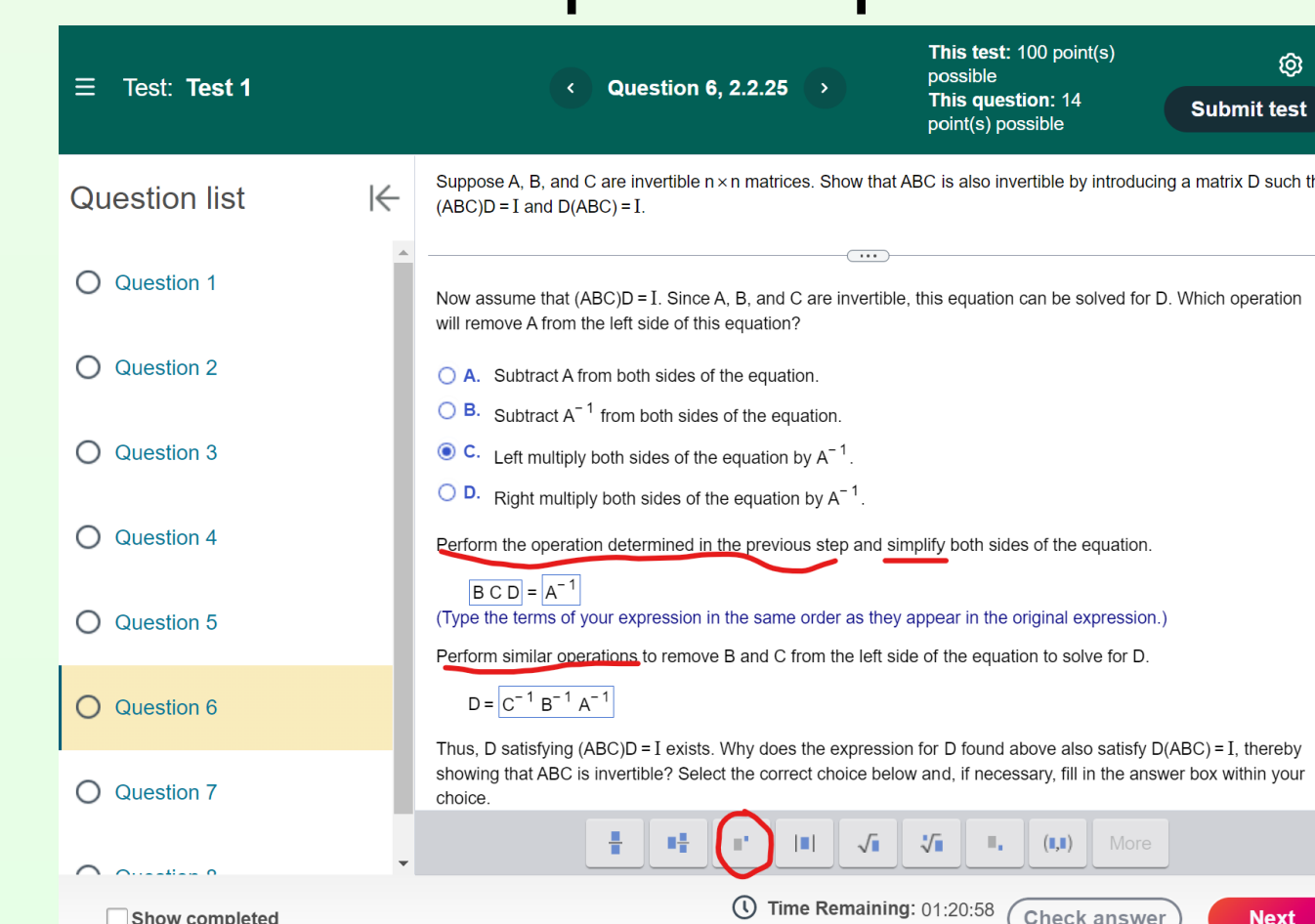


Quiz/test: immediate grading

Essay question (with solution):



Guided proof question:



Feedback and Observations

- Students like the multiple and unlimited number of attempts in homework.
- Students use the hints and “similar problem” for practice.
- Many students use the Study Plan to practice more widely.
- A few questions had input problems.
- Students complain less about theory questions.
- Still prefer calculation problems, however, these are smaller/shorter than ordinary.
- Essay questions and “show your work” considered time-consuming.

Limitations

- Time on task is good and well-designed questions encourage deeper thinking. Still, less review of textbook than desirable and more learning by trying and guessing.
- Collection of accompanying work is desirable, but negates some of the automatic grading.
- Team-based learning difficult due to changing numbers for each attempt.
- With many students using the questions, online solutions likely available.
- Insufficient verbal interaction with instructor to internalize the vocabulary of the subject.

Excessive, pedagogically unsound class size remains the key obstacle to improving passing rates!