Semester Reports For Math 322

1 Relevant Student Learning Outcomes (SLOs)

In discussion with the faculty, the undergraduate committee created the student learning outcomes for the pure and applied math majors. The following SLOs are pertinent to the course content in Math 322.

1. Understand the role of definitions and proofs in mathematical work; be able to produce viable proofs on your own with an appreciation of careful use of language; and recognize whether a proof is valid or not.
2. Demonstrate an understanding of algebraic structures and, in particular, an algebraic viewpoint of the real number system.
3. Demonstrate an understanding of the fundamental importance that functions play in mathematics.

Math 322 offers several opportunities for creating exam questions which assess student performance in these areas. Outcome #1 will be naturally be assessed in most exam questions. Outcome #2 can be assessed by questions pertaining to groups, rings and fields and their substructures. Outcome #3 can be assessed by questions pertaining to binary operations, homomorphisms, one to one correspondences and group actions.

Every instructor for Math 322 is asked to complete a "Semester Report", which provides data on the performance of these students in achieving these outcomes. Instructors will be asked to separate the results from different concentrations and majors. To that end, students should be asked to self-identify which major or concentration they have declared, perhaps with a question on the first exam or on a survey administered to the class.

Finally, instructors should ask students to self-assess their performance on these SLOs through questions on an end of semester survey.

2 Rubrics

The purpose of the rubrics is to ensure that assessment occurs independently from the instructor's chosen grading scale. For example, some instructors may view that a student who gets 80-90% of the points to have given a "very good" solution while others may expect 100% credit to be rated at this level, using the "excellent" rating to distinguish exceptional solutions.

2.1 Rubric for SLO #1:

Understand the role of definitions and proofs in mathematical work; be able to produce viable proofs on your own with an appreciation of careful use of language; and recognize whether a proof is valid or not.

Excellent	Exemplary proof, with full justification for each step and the logic of argument flows naturally. The chosen strategy for the proof is natural, well motivated, and effective. Proof shows full comprehension of the pertinent mathematical definitions. Mathematical and English language is highly articulate.
Very Good	Cogent proof, with most key steps clearly justified. The chosen strategy for the proof is apparent and effective. Proof shows good comprehension of the pertinent mathematical definitions. Mathematical and English language is easily understandable.
Satisfactory	Comprehensible proof, with justification for the essential steps. The chosen strategy for the proof is recognizable and mostly effective. Proof shows reasonable comprehension of the pertinent mathematical definitions. Errors are relatively minor. Mathematical and English language is decipherable.
Questionable	Partial progress on the proof, only some essential steps are justified. The chosen strategy for the proof has potential. Proof shows an indication of some comprehension of the pertinent mathematical definitions. Errors are significant. Mathematical and English language is incomplete.
Unacceptable	Poorly written proof, essential steps lack justification. The chosen strategy for the proof is unclear and/or ineffective. Comprehension of the pertinent mathematical definitions is uncertain. Errors are striking. Mathematical and English language is unclear.

2.2 Rubric for SLO #2:

Demonstrate an understanding of algebraic structures and, in particular, an algebraic viewpoint of the real number system.

Excellent	Exemplary proof pertaining to groups, rings, fields, or some substructures of the aforementioned structures. The chosen strategy for the proof is natural, well motivated, and effective. Student has a clear understanding of what properties need to be shown to exhibit the set along with binary operation(s) is the algebraic structure in question. Mathematical and English language is highly articulate.
Very Good	Cogent proof pertaining to groups, rings, fields, or some substructures of the aforementioned structures. The chosen strategy for the proof is apparent and effective. Student has a good understanding of what properties need to be shown to exhibit the set along with binary operation(s) is the algebraic structure in question. Mathematical and English language is easily understandable.
Satisfactory	Understandable proof pertaining to groups, rings, fields, or some substructures of the aforementioned structures. The chosen strategy for the proof is recognizable and mostly effective. Student has an understanding of what properties need to be shown to exhibit the set along with binary operation(s) is the algebraic structure in question. Errors are relatively minor. Mathematical and English language is decipherable.
Questionable	Incomplete proof which demonstrates a partial comprehension of groups, rings, fields, or some substructures of the aforementioned structures.. The chosen strategy for the proof has potential. Proof shows an indication of some comprehension of the pertinent mathematical definitions. Student indicates a partial understanding of what properties need to be shown to exhibit the set along with binary operation(s) is the algebraic structure in question. Errors are significant. Mathematical and English language is incomplete.
Unacceptable	Poorly written proof which demonstrates little or no comprehension of showing a set with one (or two binary operations) is a specific type of group, ring field or some substructure of the aforementioned structures. The chosen strategy for the proof is unclear and/or ineffective. Student does not demonstrate an understanding of what needs to be shown to exhibit the set along with binary operation(s) is the algebraic structure in question. Errors are striking. Mathematical and English language is unclear.

2.3 Rubric for SLO #3:

Demonstrate an understanding of the fundamental importance that functions play in mathematics.

Excellent	Exemplary proof pertaining to binary operations, homomorphisms, one to one correspondences and group actions. Proof clearly and concisely justifies all of the properties of the function in question. Mathematical and English language is highly articulate.
Very Good	Cogent proof pertaining to binary operations, homomorphisms, one to one correspondences and group actions. Proof does a good job of justifying almost all of the properties of the function in question. Mathematical and English language is easily understandable.
Satisfactory	Comprehensible proof pertaining to binary operations, homomorphisms, one to one correspondences and group actions. Proof does a satisfactory job of justifying most of the properties of the function in question. Mathematical and English language is decipherable.
Questionable	Incomplete proof pertaining to binary operations, homomorphisms, one to one correspondences and group actions. Student may show some comprehension of the relevant function, but has gaps in the justification. Errors are significant. Mathematical and English language is incomplete.
Unacceptable	Poorly written proof which casts some doubt as to whether or not the student understands binary operations, homomorphisms, one to one correspondences and group actions. Errors are striking. Mathematical and English language is unclear.