MATH 3110/5110 (Barsamian) Final Exam

Friday, May 1, 2020

Schedule:

- Teams Meeting will start at 3:00pm.
- Exam will be launched as an assignment in Blackboard at 3:10pm.
- Exam must be submitted by 6:10pm.

Exam is 6 problems

Outside Resources:

- You may use a Calculator or a website-based calculator for computing values.
- You may use these materials:
    - Your textbook.
    - My lecture notes from the course web page
    - Your own written notes, from lectures and studying
    - Your graded homeworks, quizzes and exams, and my solutions to those.
- Things that you cannot use
    - You may not search for solutions or proofs on the web.
    - You may not get help from anybody else

Pages for your solution:

- Your First page should just have your name written on it and no other work. This blank first page will be where I write scores.
- All other pages should have no more than 1 problem per page.
- When you finish a problem, start a new page.
- (So your document should be at least 7 pages)
- At the end, assemble your problems in order (with the cover page in front)

Submitting your work

- Use CamScanner to take pictures of your work and submit it as a single PDF.
    - Work that is submitted as jpeg files, or some other format, will not be graded.
    - Work that is submitted in multiple PDF files will not be graded.
- If you have trouble submitting your file to blackboard, email it to me
    - Send from your OU email address
        - (I won't open email from a non-OU email address.)
    - Send it to my OU email address barsamia@ohio.edu

The Exam starts on the next page. ➔

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[0] Print your name on a blank sheet of paper. Don't put anything else on the page.

[1] (Start a new sheet of paper!) Equivalence Relation Problem

This topic did not play a big role in this course, and is not a hard topic, but it will come up in later courses. Study these problems

- 12#6 (from Homework 1) about divisibility
- 1.2#8 (from Homework 1) about $x_1^2 + y_1^2 = x_2^2 + y_2^2$
- 1.2#13 (From Homework 1) about $s_1^2 = s_2^2$
- Quiz 1 problem [2] about a made up relation on the set of real numbers
- Exam 1 problem [1] about the $\leq$ relation on the set of real numbers
- 2.1#24 about parallel relation
- 3.3#4 (Homework 4 problem [4] and Exam 2 problem [4]) about Segment Congruence

[2] (Start a new sheet of paper!) Problem about injective, surjective, bijective

This topic definitely will come up in later courses, and the more times you look at it, the better you'll understand it. Study these problems:

- Homework 2 problems [1], [2], [3]
- 1.3 #6, 7, 8, 10, 11, 12
- X1 [2] statements about injective

[3] (Start a new sheet of paper!) Problem involving PSA

Problems about the PSA axiom give you practice thinking about conditional statements and their contrapositives. Study these problems:

- 4.1#4 (Quiz 5) prove that each half plane contains a point
- 4.1#5 (class activity) prove that each half plane contains three non-collinear points
- Exam 2 problem [6] proving that three points are non-collinear and lie on the same half plane
- 4.4#4 (Homework 6 problem [2]) prove Thm 4.4.6 about points on side of a triangle are in the interior of the opposite angle
- 4.4#5 about points in interior of an angle
- 4.4#12 about proving converse of crossbar theorem
- 4.4#15 (Homework 6 problem [3]) Prove Th 4.4.10 about interior of triangle being a convex set
- 4.5#3 (Also Homework 6 problem [4]) Prove Theorem 4.5.3 about convex quads having each vertex contained in interior of opposite angle

The Exam continues on the next page. ➔

[4] (Start a new sheet of paper!) <u>Problem involving demonstrating a counterexample</u>

Many counterexamples don't involve much work. They are worth remembering because they help you understand the significance of the hypotheses of the theorems. (That is, theorems only apply to very specific situations.) Study these problems

- 1.3#10, 11 about injective/surjective
- 3.2#10 about 3 non-collinear points in taxicab geom that satisfy distance equation
- Homework 4 problem [2] about 3 non-collinear points in taxicab geom that satisfy distance equation
- Exam 2 problem [1] does three points having the distance property imply collinear?
- 4.1#11,13 about convex
- 4.5#8 (Exam 3 problem [1]) about whether or not a convex quad is a convex set
- 5.1#7 about unique point in angle construction axiom
- 5.3#9 (Homework 7 problem [3]) about Pythagorean theorem not holding in poincare geometry (and is therefore not a theorem of protractor geometry)
- 5.3#18 about isosceles triangle without congruent base angles in protractor geometry
- 6.1#12 about taxicab isosceles triangle without congruent base angles
- 6.3#14 Example demonstrating that there cannot be an SSA congruenc theorem
- 6.4#5 Show that Theorem 6.4.2 about the perpendicular distance being shortest is not valid in Taxicab Plane (and therefore is not a theorem of protractor geometry)
- 6.4#5 Show that the Pythagorean Theorem is not valid in Taxicab plan (and therefore is not a theorem of protractor geometry)
- 6.4#3 Show that Pythagorean theorem does not hold in poincare plane(and therefore is not a theorem of protractor geometry)
- 6.4#7 Show that the hypotenuse need not be the longest side in a protractor geometry (and therefore is not a theorem of protractor geometry)

[5] (Start a new sheet of paper!) <u>A Proof</u>

Study these problems:

- 5.3#6 (on Homework H07) Prove Vertical Angle Thereom
- 6.1#5 Prove Equilateral ➔ Equiangular
- 6.1#8 about Quad
- 6.1#9 about quad
- 6.2#1 Prove Th 6.2.2 CA ➔ CS
- 6.2#2 Prove that equiangular ➔ Equilateral
- 6.2#5 proof about triangle
- 6.2#7 proof about quad
- 6.2#8 proof about triangle
- 6.3#3 prove that in protractor geom, the two exterior angles at a vertex are congruent
- 6.3#4 In neutral geom, prove that the base angles of an isosc triangle are acute
- 6.3#5 Prove Th 6.3.7 BA ➔ BS

[6] (Start a new sheet of paper!) Illustrate and justify some of the steps in Theorem 6.4.6 about Perpendicular Bisectors