ADDITIONAL FILES FOR UNIT II

Basic material (may be covered on quizzes or examinations)

http://math.ucr.edu/~res/math133/geometrynotes02a.f13.pdf

http://math.ucr.edu/~res/math133/geometrynotes02b.f13.pdf

The course notes for this unit (not really additional files).

http://math.ucr.edu/~res/math133/synthetic-analytic.pdf

This is a chart summarizing the main points of the synthetic and analytic approaches to geometry and the standard methods for relating each approach to the other. Several files under the heading "Supplementary material" $(q.v.)$ provide more details concerning some items in this chart.

http://math.ucr.edu/~res/math133/betweenness.pdf

http://math.ucr.edu/~res/math133/separation.pdf

These two files describe the interpretation of betweenness and separation in terms of vectors and coordinates. **Some material from these files will be important (or at least extremely useful) for the balance of this course.**

http://math.ucr.edu/~res/math133/convex-functions.pdf

This file discusses the standard criteria from differential calculus for recognizing convex regions bounded by graphs of continuous functions.

http://math.ucr.edu/~res/math133/isosceles-fallacy.pdf

Additional drawings for the fallacious proof that every triangle is isosceles (which appears on pages $56 - 57$ of the notes).

http://math.ucr.edu/~res/math133/cut+paste-fallacies.pdf

Additional examples of fallacies like the "proof that $99 = 100$" which appears on page 58 of the notes.

http://math.ucr.edu/~res/math133/math-fallacies.pdf

Some further references for other mathematical fallacies.

http://math.ucr.edu/~res/math133/examples0101.pdf

http://math.ucr.edu/~res/math133/examples0101a.pdf

The first file is a solved problem from Unit I, and the second is a comment about one key issue that is "intuitively obvious" but was not addressed in the first file (namely, showing that the constructed bisector actually lies in the interior of the given angle).

http://math.ucr.edu/~res/math133/vert-angles.pdf

This file presents a vector – geometric proof of the Vertical Angle Theorem (Proposition 3.7 in the notes); it provides an example for which the synthetic proof is much simpler than the analytic one.

http://math.ucr.edu/~res/math133/trianglecongruence.pdf

This file contains proofs that the **SAS** criterion for congruence of triangles implies the **ASA** and **SSS** criteria (see page **66** of the course notes for statements of these criteria); the proofs are written at the same level as the material in the course notes.

http://math.ucr.edu/~res/math133/superposition.pdf

Old geometry textbooks frequently stated that *two figures are congruent if they can be made to coincide*; in other words, one can mover the second figure — without changing its size or shape — so that it lies exactly on top with the first (a process often called ***superposition***). This file discusses one standard way that one can make this notion mathematically precise.

http://math.ucr.edu/~res/math133/reflections.pdf

This file gives an algebraic description of mappings from the plane to itself which take a point **x** to its mirror image with respect to some line **L**.

http://math.ucr.edu/~res/math133/elltangents.pdf

This file shows how one can use geometric transformations to generalize a standard result of Euclidean geometry (the existence of two tangents from an external point to a circle) from circles to ellipses. The argument illustrates the potential uses of geometric transformations for reducing geometric proofs to consideration of some important special cases.

http://math.ucr.edu/~res/math133/congruence-independence.pdf

This provides another example of an axiomatic system which satisfies all the axioms up to those for linear and angular measurement, but does not satisfy the **SAS** criterion for congruence of triangles; it resembles the example studied on pages **77 – 79** of the course notes, but the definition of distance is different.

http://math.ucr.edu/~res/math133/affine-convex.pdf

This document establishes some basic properties of affine transformations involving convex sets and applies these results to determine whether certain types of plane subsets are affine equivalent.

http://math.ucr.edu/~res/math133/aabUpdate03f13.pdf

http://math.ucr.edu/~res/math133/aabUpdate05f13.pdf

These files include lists of the assigned exercises for this unit of the course.

http://math.ucr.edu/~res/math133/math133exercises02.f13.pdf

http://math.ucr.edu/~res/math133/math133exercises02a.f13.pdf

http://math.ucr.edu/~res/math133/math133exercises02aa.f13.pdf

http://math.ucr.edu/~res/math133/math133exercises02b.f13.pdf

http://math.ucr.edu/~res/math133/math133exercises02ba.f13.pdf

The entire set of exercises for this unit of the course.

http://math.ucr.edu/~res/math133/math133solutions02b.f13.pdf

http://math.ucr.edu/~res/math133/math133solutions02ba.f13.pdf

http://math.ucr.edu/~res/math133/math133solutions02bb.f13.pdf

http://math.ucr.edu/~res/math133/math133solutions02bc.f13.pdf

http://math.ucr.edu/~res/math133/math133solutions02bc.figures.f13.pdf

These files contain solutions to exercises for this unit of the course, with the last file containing drawings for the next to last file.

Supplementary material

All the files in http://math.ucr.edu/math133/geometrynotes01x.f13.pdf under the heading, "Supplementary material," except for http://math.ucr.edu/~res/math133/centroids.pdf, could be added to this list.

http://math.ucr.edu/~res/math133/polya.pdf

This file gives some classic step – by – step suggestions for solving mathematical problems.

http://math.ucr.edu/~res/math133/foundations01.pdf

http://math.ucr.edu/~res/math133/foundations02.pdf

http://math.ucr.edu/~res/math133/foundations03.pdf

These files contain summaries of the foundations for the analytic and synthetic foundations of elementary geometry. The first file summarizes the foundations of the analytic approach, the second summarizes the foundations of the synthetic approach, and the third summarizes the means for showing that each of these approaches yields the structural data which define the other.

http://math.ucr.edu/~res/math133/metgeom.pdf

This file discusses some facts about the vector geometry of Euclidean spaces that shed light on the notion of congruence in this course. Since geometric similarity has not yet been covered in this course, the discussion of this topic on pages $3 - 5$ and the top of page 12 should be omitted at this point (similarity will be covered in Section $\mathbf{III.5}$ of the course notes).

http://math.ucr.edu/~res/math133/verifications.pdf

This document summarizes the process for verifying that the data defined by the analytic approach to geometry satisfy the axioms in the synthetic approach. The discussion is essentially self – contained, but for some simple details there are references to the files http://math.ucr.edu/~res/progeom/pgnotes01.pdf and http://math.ucr.edu/~res/progeom/pgnotes02.pdf. There is also a reference to the file http://math.ucr.edu/~res/math133/trianglecongruence.pdf, which is described above.

http://math.ucr.edu/~res/math133/extreme-pts.pdf

This document develops methods for verifying that certain geometric figures — most notably, a triangle and a convex quadrilateral — are not affine equivalent (and hence not congruent in the sense of this course). It relies heavily on results from the previously cited file http://math.ucr.edu/~res/math133/affine-convex.pdf, and at several points the explanations or references are not very detailed (the exposition is at a more advanced level than most of the files for this course).

Optional material

All of the files in **http://math.ucr.edu/math133/geometrynotes01x.f13.pdf** under the heading, "Optional material," could be added to this list.

http://math.ucr.edu/~res/math133/crossrefsStillwell.pdf

Cross – references to a textbook that has recently been used for this course (this file could also be added to **http://math.ucr.edu/math133/geometrynotes01x.f13.pdf**).