Math 133
Fall 2018

UPDATED GENERAL INFORMATION — NOVEMBER 8, 2018

The second quiz will take place on **Tuesday, November 13, 2018.** It will resemble an exercise from one of Sections II.3, III.1 (but only the material on 2-dimensional geometry in the latter), and III.2–III.3. Although Sections II.4 and II.5 do not appear explicitly on this list, it is quite possible that some material from the beginnings of these sections will be implicit in the quiz problem. Specifically, this includes everything up to the subheading *Classical superposition* in Section II.4 (but nothing further) and everything up to the subheading *Parallelism and affine transformations* in Section II.5 (but nothing further). Also, as is generally the case with mathematics courses, earlier material (specifically from Sections I.3–I.5 and II.1–II.2) may be implicit in the quiz problem.

The results on inequalities involving triangles should not be overlooked. This includes the Exterior Angle Theorem. There are two problems from previous quizzes in the files `quiz2a.pdf` and `quiz2b.pdf`, and the problems below are also recommended.

1. Suppose that ΔABC is a right triangle with a right angle at B, and let D be the midpoint of $[BC]$. Prove that if the ray $[AD$ bisects $\angle CAB$ and $\alpha = |\angle CAB|$, then $\tan \frac{1}{2}\alpha = \frac{1}{2} \tan \alpha$. Next, prove that $\tan \frac{1}{2}\theta < \frac{1}{2} \tan \theta$ for all θ such that $0 < \theta < \frac{1}{2}\pi$. Why does this imply that $[AD$ does not bisect $\angle CAB$?

2. Suppose we are given a parallelogram $ABCD$, and let $E \in (AB)$ and $F \in (CD)$ be such that $[DE$ bisects $\angle CDA$ and $[BF$ bisects $\angle ABC$. Prove that the lines DE and BF are parallel.

3. Suppose we are given isosceles triangle ΔABC with $|AC| = |BC|$, and we have points $D \in (AC)$, $E \in (BC)$ such that $|AD| < |BE|$. Prove that $|\angle ADE| < |\angle BED|$.