

MATHEMATICS 133, FALL 2020, QUIZ 3

Directions: The answers to this quiz are to be submitted to the instructor of your discussion section by **11:59 P.M. on Wednesday, December 9**. Please include your name, student identification number, and discussion section number on the worked out quiz.

1. Suppose that A, B, C, D and A', B', C', D' (in those orders) form the vertices of convex quadrilaterals. We shall say that the convex quadrilaterals $ABCD$ and $A'B'C'D'$ are classically congruent if the lengths of the corresponding sides and the measures of the corresponding angles are equal. Show that two parallelograms are classically congruent if $|AB| = |A'B'|$, $|\angle ABC| = |\angle A'B'C'|$ and $|BC| = |B'C'|$.

2. If $ABCD$ is a convex quadrilateral, then we shall say it is kite – shaped with respect to the diagonal AC if $|AB| = |AD|$ and $|CB| = |CD|$. Suppose that $A'B'C'D'$ is also a convex quadrilateral which is kite – shaped with respect to the diagonal $A' C'$. For **each** of the following sets of assumptions, either prove that the two quadrilaterals are classically congruent or construct a pair of counterexamples which satisfy the given assumptions but are not classically congruent:

- (a) $|AB| = |A'B'|$, $|\angle ABC| = |\angle A'B'C'|$ and $|BC| = |B'C'|$.
- (b) $|AB| = |A'B'|$, $|\angle BAC| = |\angle B'A'C'|$ and $|BC| = |B'C'|$.

[**Hints:** For the vertices B and D , what can we say about the associated vertex angles? Prove your conclusion.]

In both cases, it will probably be helpful to draw pictures.

As in the first two quizzes, any valid approach to finding the answers is acceptable (but you may be asked to justify a procedure if it is nonstandard). Although you may consult with other students about material related this problem, the quiz is **NOT** collaborative; the answers you submit must be your own work and no one else's.