

1. (6 pts) For each of the following, identify what information needs to be added to the given so it is possible to justify the conclusion.



2. (10 pts) Consider the following statement: The diagonals of an isosceles trapezoid are congruent.

Circle the letter by the statements below which are **equivalent** to the given statement in bold.

- a. If a trapezoid is isosceles then its diagonals are congruent.
- b. If a trapezoid has congruent diagonals then it is isosceles.
- c. All isosceles trapezoids have congruent diagonals.
- d. Only trapezoids with congruent diagonals are isosceles.
- e. If a trapezoid does not have congruent diagonals then it is not isosceles.

Math 213 Exam 2A Fall 2018

3. (16 pts) Fill in the missing steps in the proof below.

Given: JKLM is a parallelogram

 \overline{KM} bisects < JKL and < JML

Prove: JKLM is a rhombus

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Statement		Reason
1.	JKLM is a parallelogram \overline{KM} bisects < JKL and < JML	1. Giver
2.	$< JKM \cong < LKM$	2.
3.	$< JMK \cong < LMK$	3.
4.	$\overline{KM} \cong \overline{KM}$	4.
5.	$\Delta JKM \cong \Delta LKM$	5.
6.	$\overline{JK} \cong \overline{KL}$	6.
7.	$\overline{JK} \cong \overline{ML}$ and $\overline{JM} \cong \overline{KL}$	7.
8.	$\overline{JK} \cong \overline{ML} \cong \overline{JM} \cong \overline{KL}$	8.
9.	JKLM is a rhombus	9.

- 4. (12 pts) Make a Venn diagram showing the relationships among the sets of shapes in each part below. If an overlap is a particular set of shapes that we have a name for, label it.
 - a. Trapezoid, rectangle, quadrilaterals with congruent diagonals

b. Rhombus, parallelogram, kite

 (12 pts) The following three points, Q, R, and S, are three corners of a quadrilateral. Identify a fourth point, T, so that QRST is a square. Graph QRST on the grid below. Show work to justify that QRST satisfies the definition of a square.

$$Q = (-4, 2)$$
 $R = (-1, -2)$ $S = (3, 1)$

6. (8 pts) Consider the reasoning in the following proof.

Given: ABCD is an isosceles trapezoid

Prove: $\langle ADE \cong \langle BCE \rangle$



Statement	Reason
1. ABCD is an isosceles trapezoid	1. Given
2. $\overline{AB} \mid \mid \overline{DC}; \overline{AD} \cong \overline{BC}$	2. Def'n isosceles trapezoid
3. Draw \overline{AE} so that it goes through point A and is parallel to \overline{BC} ($\overline{AE} \overline{BC}$)	3. Parallel Postulate
4. ABCE is a parallelogram	4. Def'n parallelogram
5. $\overline{AE} \cong \overline{BC}$	5. Opposite sides of a parallelogram are congruent
6. $\overline{AE} \cong \overline{AD}$	6. Substitution
7. $<$ ADE \cong $<$ AED	7. Base angles of an isosceles triangle are congruent
8. $ BCE \cong BAE $	8. Opposite angles of a parallelogram are congruent
9. $<$ BAE \cong $<$ ADE	9. Alternate interior angles are congruent when lines are parallel
10. $<$ ADE \cong $<$ BCE	10. Substitution

Identify the incorrect step in the proof, explain why it is incorrect.

How should the proof be written in order to correct the error. Clearly indicate which statements and/or reasons need to be replaced, and with what.

7. (16 pts) Prove the following theorem:





Math 213 Exam 2A Fall 2018

8. (10 pts) Consider the following conjecture:

In a kite, the diagonals are perpendicular.

a. Sketch an appropriate diagram, label its vertices, and mark the given information on the diagram. Do **not** mark the conclusion (the claim that is to be proved).

b. Using your labeled diagram, specify the "Given" and the "To Prove" for this conjecture:

Given:

To Prove:

YOU DO NOT NEED TO PROVE THIS CONJECTURE!!

Please copy and sign: I pledge on my honor that I have not given or received any unauthorized assistance on this exam. [signed]