Instructors: 1. Dr. Rola Alseidi 2. Mr. Ahmad Hamdan	Philadelphia University Faculty of Science Department of Mathematics Midterm Exam	Academic Year: 2023-2024 Semester: Fall Date: 21/4/2024 Course: Euclidean Geometry Duration: 60 Min.
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Name:

I.D. Number:

## Question One: [7 points (2,2,3)]

1. In the triangle ABC, if a = 10, b = 11 and c = 15. Is ABC a right triangle? Which theorem are you using?

2. In the triangle ABC, if B = 90,  $a = 5\sqrt{5}$ , b = 15, find c. Which theorem are you using?

3. Find a Pythagorean triple that has a side of length 28.

Question Two: [5 points (2,3)]

1. What does the **AAS Congruence Theorem** say? **Start**: If ABC and A'B'C' are two triangles such that .....

2. In quadrilateral ABCD, prove that AB + BC + CD + DA > 2AC.

Question Three: [6 points (3,3)]

- 1. Fill in the space: The **ASS Pseudo-Congruence Theorem** states that if ABC, A'B'C' are two triangles such that A = A', b = b', and  $\ldots = \ldots$ , then either  $\angle \ldots = \angle \ldots$  or  $\angle \ldots + \angle \ldots = \ldots$ .
- 2. Decide whether the triangle whose side lengths are 3, 8, 9 is acute, right, or obtuse.

**Question Four:** [2 points] Straight lines AB, CD intersect at M. A proposition in Book I (a) stated that

$$\angle AMC = \angle BMD \tag{(*)}$$

The proof follows immediately from the fact that

$$\angle AMC + \angle BMC = \angle BMD + \angle BMC \tag{**}$$

- 1. Circle the correct answer: The angles in (\*) are called (alternate, vertical, allied) angles.
- 2. Circle the correct answer: The statement in (\*\*) is a (**proposition**, **postulate**) in Euclid's book.

**Question Five:** [6 points (3,3)] Fill in the space:

- 1. Let D be a point on the side BC of triangle ABC. If AB = AC, and if AD is perpendicular to BC, then triangles ABD and ..... are congruent by the ..... congruence theorem. It follows that  $DB = \ldots$ .
- 2. Let P be a point on the angle bisector of  $\angle A$  in the triangle ABC. If X and Y are points on BA, CA, respectively, such that PX is perpendicular to BA and PY is perpendicular to CA, then triangles PAX and ..... are congruent by the ..... congruence theorem. It follows that  $PX = \ldots$

Question Six: [4 points] Let ABC be a triangle in which M is the point of intersection of the medians BB' and CC'. Prove that if MB = MC, then AB = AC.

## Question Seven: [6 points (1,5)]

- 2. Prove that if ABCD is convex quadrilateral in which AB = CD and B > C, then D > A.