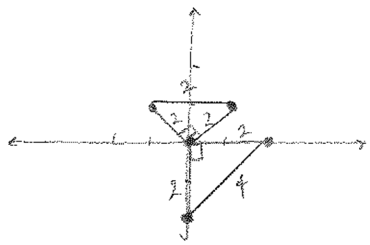
MATH 367 SPRING 2016 EXAM 2 SOLUTIONS

White version:

1. The Triangle Inequality (Theorem 4.3.2).
   $5+11=16$, $16<17$,
   so there is no such triangle.

2.



The side lengths (in taxicab geometry) are as indicated, and right angles are marked. If the SAS Postulate holds, then the triangles are congruent, due to each having two sides of length 2 with a right angle in between. However, they are not congruent since the third side of one triangle has length 2, and the other 4. Therefore the SAS Postulate does not hold in taxicab geometry.

3. (a) $BC > EF$
   (b) The Hinge Theorem (Theorem 4.3.3).

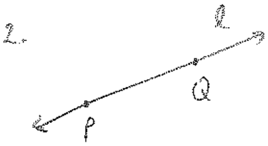
4. See yellow version #2.

5. (a) F
   (b) T
   (c) F
   (d) T
   (e) F

Yellow version:

1. (a) $BC < EF$
   (b) The Hinge Theorem (Theorem 4.3.3).

2.



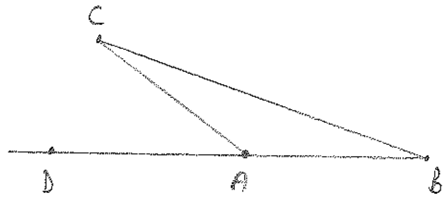
For each pair of points P, Q that lie on ℓ, all the points on the line segment $\overline{PQ}$ also lie on ℓ.

3. (a) T
   (b) F
   (c) F
   (d) T
   (e) F

4. The Triangle Inequality (Theorem 4.3.2).
   $6+9=15$, $15<16$,
   so there is no such triangle.

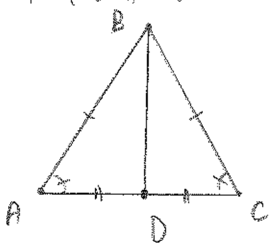
5. See white version, #2.

6. (same on both versions)



Suppose $\triangle ABC$ is a triangle for which $\angle CAB$ is obtuse. Let D be a point on $\overleftrightarrow{AB}$ such that $D*A*B$. Then $\angle CAB$ and $\angle CAD$ form a linear pair. By the Linear Pair Theorem, the sum of their angle measures is $180°$. Since $\angle CAB$ is obtuse, this implies that $\angle CAD$ is acute. By the Exterior Angle Theorem, $\mu(\angle CAD)$ is greater than the measure of either of its remote interior angles, so they are also both acute.

7. (white version)



By the Isosceles Triangle Theorem, $\angle BAD \cong \angle BCD$. Since D is the midpoint of $\overline{AC}$, we know $\overline{AD} \cong \overline{DC}$. By the SAS Postulate, $\triangle BAD \cong \triangle BCD$, which implies $\mu(\angle BDA) = \mu(\angle BDC)$. Since $\angle BDA$ and $\angle BDC$ form a linear pair, the Linear Pair Theorem implies that $\mu(\angle BDA) + \mu(\angle BDC) = 180°$. Therefore, $\mu(\angle BDC) = 90°$, that is, $\angle BDC$ is a right angle.

7. (yellow version) This is the same, with A, B, C, D replaced by P, Q, R, S.