MATH 2051, Problems in Geometry
Fall 2007
Toby Kenney

Homework Sheet 1

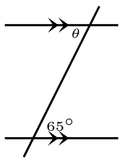
Due in: Wednesday 19th September, 11:30 PM

Note that diagrams are not drawn to scale. Scale drawing does **not** constitute a proof. Justify all your answers.

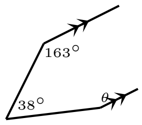
Compulsory questions

1 Find the angle θ in each of the following diagrams:

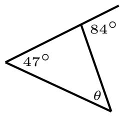
(i)



(ii)



(iii)



2 Which of the following pairs of triangles are (a) congruent? (b) similar?

(i)

(ii)

(iii)

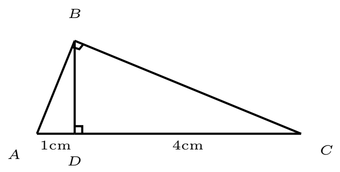
(iv)

(v)

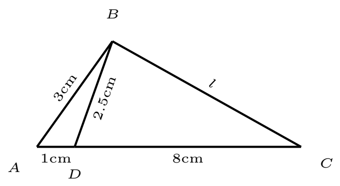
3 (a) Are any two quadrilaterals with the same side lengths congruent? Give a proof or a counterexample.

(b) Are any two quadrilaterals with the same angles similar? Give a proof or a counterexample.

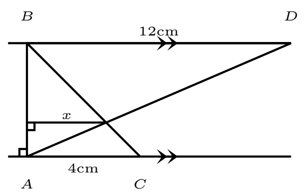
4 Let ABC be a right-angled triangle, with the right angle at B. Let D be the point on the side AC such that BD is perpendicular to AC. (See the diagram below.) Suppose AD=1cm, and DC=4cm; find BD.



5 Find the length l in the following diagram:



6 Find the length x in the following diagram:



7 A parallellogram is a quadrilateral $ABCD$ in which both pairs of opposite sides are parallel. (i.e. AB and DC are parallel and AD and BC are parallel.)

(a) Prove that if $ABCD$ is a parallellogram then $AB = DC$ and $AD = BC$.

(b) Prove that if $ABCD$ is a quadrilateral such that $AB = DC$ and $AD = BC$, then $ABCD$ is a parallellogram.