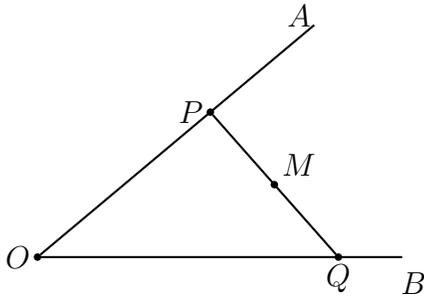


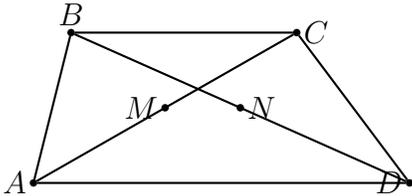
## MAT 360: PRACTICE MIDTERM

Please remember that you are only allowed to use notions and results we had proved in class. “Construct” means “construct using a ruler and compass”.

1. Given an angle  $\angle AOB$  and a point  $M$  inside it, construct a segment  $PQ$  such that
  - $M$  is the midpoint of  $PQ$
  - $P$  is on side  $OA$
  - $Q$  is on side  $OB$



2. Given a trapezoid  $ABCD$  with bases  $AD = 5\text{cm}$ ,  $BC = 3\text{cm}$ , find the distance  $MN$ , where  $M$  is midpoint of  $AC$ ,  $N$  is the midpoint of  $BD$ . (You must prove your result!)



3. Construct a triangle  $\triangle ABC$ , given  $\angle A$  and the difference  $AC - AB$
4. In a triangle  $\triangle ABC$ , let  $AA'$ ,  $BB'$  be altitudes from vertices  $A$ ,  $B$  respectively. Prove that if  $AA' \simeq BB'$ , then  $\triangle ABC$  is isosceles.
5. Let  $C_1$ ,  $C_2$  be two circles which are tangent to each other; let  $P$  be the tangency point. Let  $l, m$  be two lines through  $P$ . Let  $A, B, C, D$  be the intersection points of lines  $l, m$  with the circles  $C_1, C_2$ . Prove that  $ABCD$  is a trapezoid.
6. (a) Construct a triangle, given side  $BC$ ,  $\angle A$  and length of the altitude from vertex  $A$ .  
(b) Given an angle  $\angle AOB$  and a circle  $C$  with center at  $O$ , construct a segment  $PQ$  such that
  - $PQ$  is tangent to  $C$
  - $P$  is on side  $OA$
  - $Q$  is on side  $OB$

