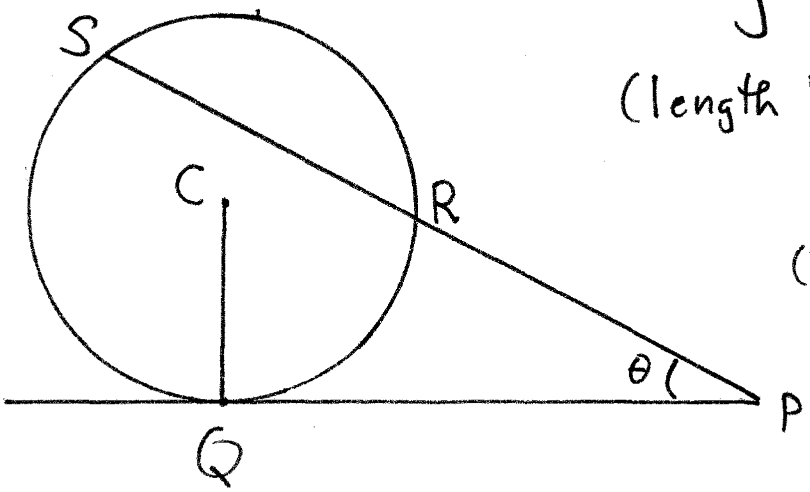
Homework I: Math. 120A Due Friday, Jan. 18, 2008



1. Prove by vector methods:

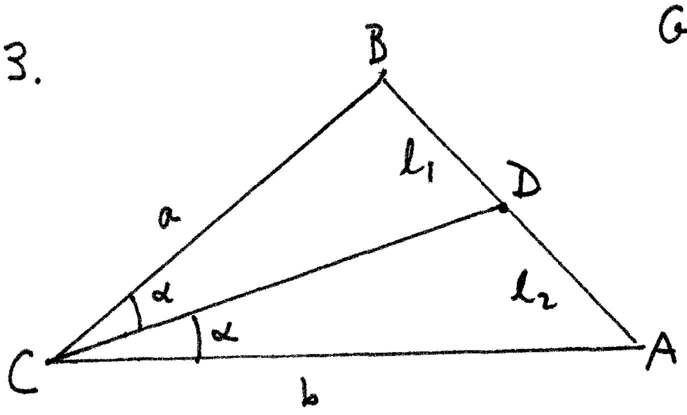
$(\text{length } PQ)^2 = (\text{length } PR) \cdot (\text{length } PS)$

(independently of the angle θ)

Here Q is such that the line from P to Q (whole line) intersects the circle in one point exactly.

2. Prove the angle $CQP = \pi/2$ (C = center of circle)

3.



Given: CD bisects angle C, that is, angle BCD = angle ACD.

Prove by vector methods:

$$\frac{\text{length } BD}{\text{length } BC} = \frac{\text{length } AD}{\text{length } AC}$$

(or $\frac{l_1}{a} = \frac{l_2}{b}$).

(Suggestion: Let $C = \vec{0}$ (origin) and $B = \vec{V}$, $A = \vec{W}$.
What is the vector expression for the point D satisfying $\frac{l_1}{a} = \frac{l_2}{b}$? Check that for that vector, angle BCD = angle DCA).