Instructor: Nándor Sieben
e-mail: nandor.sieben@nau.edu
http://jan.ucc.nau.edu/∼ns46/365/365.html
Office: AMB 175, Phone: 523-6874
Hours: MWF 11:20 – 12:20 MW 1:40 – 2:40

1. Show that in $\triangle ABC$ we have $\frac{1}{h_a} + \frac{1}{h_b} + \frac{1}{h_c} = \frac{1}{r}$.

Solution: If $K = A(ABC)$ then we have

$$\begin{aligned}\frac{1}{h_a} + \frac{1}{h_b} + \frac{1}{h_c} &= \frac{a}{2K} + \frac{b}{2K} + \frac{c}{2K} \\ &= \frac{s}{K} \\ &= \frac{1}{r}.\end{aligned}$$

2. Let P be a point inside the regular $\triangle ABC$. Show that if x, y, z are the distances of P from a, b and c respectively then $x + y + z = h$ where h is the height of the triangle.

Solution: We have

$$\begin{aligned}ah &= A(ABC) \\ &= A(ABP) + A(BCP) + A(CAP) \\ &= ax + ay + az \\ &= a(x + y + z)\end{aligned}$$

and so $h = x + y + z$.