Maxima 5.18.1 http://maxima.sourceforge.net
Using Lisp CLISP 2.47 (2008-10-23)
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Dedicated to the memory of William Schelter.
The function bug_report() provides bug reporting information.

(%i1) eq1:c^2 = a^2 + b^2 - 2*a*b*cos(%gamma);

(%o1) $c^2 = b^2 - 2\cos\left(\gamma\right)a\,b + a^2$

(%i2) eq2:subst([c=d,a=l,b=p+d],eq1);

(%o2) $d^2 = \left(p+d\right)^2 - 2\cos\left(\gamma\right)l\left(p+d\right) + l^2$

(%i3) eq3:subst(%gamma=%pi-alpha,eq2);

(%o3) $d^2 = \left(p+d\right)^2 + 2\cos\left(\alpha\right)l\left(p+d\right) + l^2$

(%i4) eq4:(d+p)*cos(beta)=h;

(%o4) $\cos\left(\beta\right)\left(p+d\right) = h$

(%i5) eq5:subst(beta=alpha-%pi/2,eq4);

(%o5) $\sin\left(\alpha\right)\left(p+d\right) = h$

(%i6) sol:solve(eq5,d);

(%o6) $\left[d = -\dfrac{\sin\left(\alpha\right)p - h}{\sin\left(\alpha\right)}\right]$

(%i7) sol_e:expand(sol[1]);

(%o7) $d = \dfrac{h}{\sin\left(\alpha\right)} - p$

(%i8) eq6:subst(sol_e,eq3);

(%o8) $\left(\dfrac{h}{\sin\left(\alpha\right)} - p\right)^2 = l^2 + \dfrac{2\cos\left(\alpha\right)h\,l}{\sin\left(\alpha\right)} + \dfrac{h^2}{\sin\left(\alpha\right)^2}$

(%i9) eq7:solve(eq6,p);

(%o9) $\left[p = -\dfrac{\sqrt{\sin\left(\alpha\right)^2 l^2 + 2\cos\left(\alpha\right)\sin\left(\alpha\right)h\,l + h^2} - h}{\sin\left(\alpha\right)}, p = \right.$

$\left.\dfrac{\sqrt{\sin\left(\alpha\right)^2 l^2 + 2\cos\left(\alpha\right)\sin\left(\alpha\right)h\,l + h^2} + h}{\sin\left(\alpha\right)}\right]$

(%i10) eq8:eq7[2];

(%o10) $p = \dfrac{\sqrt{\sin\left(\alpha\right)^2 l^2 + 2\cos\left(\alpha\right)\sin\left(\alpha\right)h\,l + h^2} + h}{\sin\left(\alpha\right)}$

(%i11)