Absurdity

Find the exact values of

$$\sqrt{2+\sqrt{3}}-\sqrt{2-\sqrt{3}}$$

and of

$$\sqrt[3]{2+\sqrt{5}}+\sqrt[3]{2-\sqrt{5}}$$

Upsetting Pitagoras

Find the smallest integer solution to the following equation:

$$\frac{1}{x^2}+\frac{1}{y^2}=\frac{1}{z^2}$$

Baby Circle

A circle with radius 1 and a circle with radius 2 touch at a point. A third circle fits between these two circles so that all three touch each other and all three have a common tangent. What is the radius of the smallest circle?

Three Ways

Given that x+y=1 find the largest value of xy by

1) coordinate geometry.
2) by calculus.
3) by algebra.

Biggest Bendy

Four rods are hinged at their ends to form a quadrilateral with fixed side lengths.
Show that the quadrilateral has a maximum area when it is cyclic.

BT.. Eat your heart out

My phone number has seven digits: if the last four digits are placed in front of the remaining three you get one more than twice my number! What is the number?