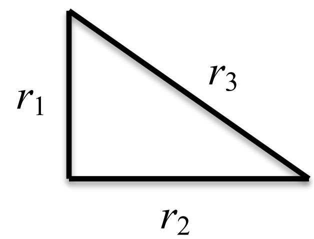
Three-dimensional Pythagorean theorem

So Hirata

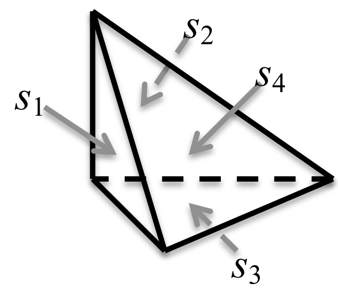
For a right triangle (top figure), the Pythagorean theorem relates the length of the hypotenuse, r_3, with the lengths of two sides, r_1 and r_2, by the equation:



$$r_1^2 + r_2^2 = r_3^2 \, .$$

The three-dimensional extension of the Pythagorean theorem relates the areas of the four surfaces of a tetrahedron that is a corner cutout of a regular cube (bottom figure). Let the areas of the three right triangles be s_1, s_2, and s_3 and let the area of the triangle subtended by the first three be s_4. They satisfy the equation,

$$s_1^2 + s_2^2 + s_3^2 = s_4^2 \, .$$



The proof is trivial. I found this theorem when I was in junior high school and thought that it must be well known and/or unimportant. I also wondered if this was a part of general higher-dimensional Pythagorean theorems. Any information is appreciated (sohirata@illinois.edu).

Note added on May 6, 2015. Mr. Rob Parrish of Georgia Tech has informed me that the above is known as De Gua's theorem. The Wikipedia page on this topic says that it and two-dimensional Pythagorean theorem are two special cases of the general Pythagorean theorem that is true for any dimension.