

# Philadelphia Area Number Theory Seminar

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## A Tree of Pythagorean Triples and Its Generalization

Abstract: It is known that all primitive Pythagorean triples  $(x; y; z)$ , that is, all positive integer triples  $(x; y; z)$  without common factor  $\gcd(x, y, z) = 1$ , can be given a certain tree-like structure. More precisely, if  $(x; y; z)$  is such a triple with  $y$  even, then there exists a unique sequence  $(k_1; \dots; k_n)$  with  $k_j \in \{1, 2, 3\}$  such that  $(x; y; z)^T = M_{k_1 \dots k_n} (3; 4; 5)^T$  with

$$M_1 := \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 3 \end{pmatrix}; \quad M_2 := \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 3 \end{pmatrix}; \quad M_3 := \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 3 \end{pmatrix};$$

We present this as a progress report on joint work with Emily Nguyen ('16) and Brandon Tauber ('16), which is supported by the Center for Undergraduate Research in Mathematics at Brigham Young University.

Thursday, March 17, 2016  
2:40-4:00PM

Bryn Mawr College  
Department of Mathematics  
Park Science Center 328

Tea and refreshments at 2:20PM in Park 355