

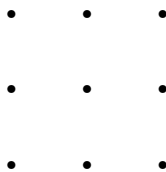
SLU Math Team 2014 Qualifying Problems

Return your work to Dr. Lamar's office (Ritter 213) before 4pm on Wednesday, March 19. Even if you feel you got none of the problems, you need to hand in something (a blank sheet of paper with your name on it?) to declare your desire to participate in the contest.

1. For $\theta = 10^{2014}$ degrees, compute $\cos(\theta^\circ)$ to two decimal places.

2. Find the units digit of $\sum_{n=0}^{99} n!$.

3. Nine dots are arranged on a square grid as shown below. Find three triangles so that each dot lies on exactly one triangle, and each triangle touches exactly three dots. Or, prove it cannot be done.



4. Find all real values of $a > 0$ such that $a^x \geq x^a$ holds for all $x > 0$.
5. Compute

$$\int_0^{\infty} \frac{\log(x)}{1+x^2} dx.$$