BERKELEY MATH TOURNAMENT
SIMPLIFICATION RULES

Answers must be written in correct mathematical notation. No partial credit is awarded except on questions requiring full justification of answers. Unless otherwise specified, all answers must be exact and simplified. Graders will take a reasonably lenient interpretation of "simplified", as guided by the following guidelines and examples. However, if answers do not conform to our guidelines, we will mark them as incorrect. The decisions of the Head Grader are final.

1. Except on the Power Round, the verb *compute* means that you should give an exact answer in simplest form. Fractions must be given in lowest terms; however, denominators do not have to be rationalized. For example, the following answers are not acceptable:
$$\frac{6}{28}, \qquad 2+2, \qquad 3^2, \qquad \sin\frac{\pi}{7} - \sin\frac{6\pi}{7}, \qquad \frac{9}{\sqrt{27}}, \qquad \frac{1}{1-i}$$
and should be replaced with the following:
$$\frac{3}{14}, \qquad 4, \qquad 9, \qquad 0, \qquad \sqrt{3}, \qquad \frac{1+i}{2}$$
On the Power Round, *compute* means to give a numerical answer; a proof is not necessary.
2. Diagrams, if provided, are not necessarily drawn to scale.
3. An ordered pair must be denoted (a, b). The same goes for ordered n-tuples.
4. All polygons are assumed to be simple and non-degenerate unless otherwise specified. Vertices are named in either clockwise or counterclockwise order.
5. Logarithms are in base e unless otherwise indicated by a subscript. For example, $\log e^2 = 2$; $\log_3 27 = 3$. We will also sometimes denote the natural logarithm ln.
6. When complex numbers are used, $i = \sqrt{-1}$.
7. The symbols $n! = n(n-1)\cdots(1)$ and $\binom{n}{r} = \frac{n!}{(n-r)!r!}$ are assigned their standard combinatorial meanings.
8. All angles are in radians unless otherwise specified.
9. Lattice points are points at integer coordinates.
10. The divisors or factors of a number are positive integers. Proper divisors of a number n are those divisors less than n.
11. Primes refer to positive integers with exactly 2 factors. In particular, 1 is not a prime.
12. The greatest lower bound of a set is the largest number that is less than or equal to all members of the set. Similarly, the least upper bound is the smallest number greater than or equal to all members of the set.
13. $\max\{a_1, ..., a_n\}$ denotes the maximum element in the set $\{a_1, ..., a_n\}$ and $\min\{a_1, ..., a_n\}$ denotes the minimum element.
14. The real part and imaginary part of a complex number z are denoted by $\operatorname{Re} z$ and $\operatorname{Im} z$ respectively. If $z = a + bi$, where a, b are real numbers, then $\operatorname{Re} z = a$ and $\operatorname{Im} z = b$.
15. The expressions $\arcsin x$ and $\sin^{-1} x$, $\arccos x$ and $\cos^{-1} x$, $\arctan x$ and $\tan^{-1} x$ always refer to the principal value of these inverse trigonometric functions.
16. The Euler totient function, $\varphi(n)$, will denote the number of integers $1 \leq k < n$ such that $\gcd(k, n) = 1$.
17. A permutation of a finite set S is a one-to-one and onto map $S \to S$.