AMERICAN REGIONS MATH LEAGUE: MATHEMATICAL CONVENTIONS:

1. The word *compute* will always call for an exact answer in simplest form. Thus, final answers such as $\frac{6}{4}$, 5+2, 2^5, $2\sin 30°$, $\sqrt{12}$, $\frac{4}{\sqrt{2}}$, and $\frac{5}{1+2i}$ are not satisfactory, but should be expressed as $\frac{3}{2}$, 7, 32, 1, $2\sqrt{3}$, $2\sqrt{2}$, and $1-2i$, respectively. In cases where there is a question as to what is *most simplified*, alternate answers may be accepted. For example, $\frac{3}{2}$, $1\frac{1}{2}$, and 1.5 are acceptable unless the problem specifies a certain form. The judge's decision is final. In the Power Question, *compute* means that a numerical answer must be supplied but a proof is not necessary.

2. When an answer is called for as an *ordered pair* (a, b), it must given in precisely that form, including the parentheses and the comma. The same applies for other choices of letters and for ordered n-tuples.

3. The length of the sides opposite vertices A, B, and C of triangle ABC will be represented by the lower case letters a, b, and c. Depending on context, the letter A may represent the vertex, the angle, or the measure of the angle. A similar convention holds for other choices of letters representing a triangle. If a quadrilateral is named $ARML$, it is understood that the vertices A, R, M, and L occur in this order around the polygon, either clockwise or counterclockwise. This convention holds for other choices of letters and for the naming of polygons in general. Unless otherwise specified, references to polygons, including triangles, should be understood to mean simple, non-degenerate ones.

4. The *Floor Function*, also called the greatest integer function, is denoted by $\lfloor x \rfloor$. It is defined as follows: if $n \le x < n+1$ where n is an integer, then $\lfloor x \rfloor = n$.

5. Logs are base 10 unless otherwise indicated. The domain of a log function is a set of positive numbers. In logs or when numbers are written in a base other than 10, the base will usually be written as a subscript. For example, $\log_4 64$ which equals 3, or 321_4 which equals $3 \cdot 4^2 + 2 \cdot 4 + 1 \cdot 4^0 = 57$.

6. If *complex numbers* are used, i will stand for $\sqrt{-1}$.

7. Symbols for *combinations* and *permutations*: $\binom{n}{r} = {}_nC_r = \frac{n!}{(n-r)! \cdot r!}$ = the number of combinations of n things taken r at a time, and ${}_nP_r = \frac{n!}{(n-r)!}$ = the number of permutations of n things taken r at a time.

8. The expressions Arcsin x, $\sin^{-1} x$, Arccos x, $\cos^{-1} x$, Arctan x, and $\tan^{-1} x$ refer to the principal values of these inverse trigonometric functions. Their ranges are as follows: $-\frac{\pi}{2} \le \sin^{-1} x \le \frac{\pi}{2}$, $0 \le \cos^{-1} x \le \pi$, and $-\frac{\pi}{2} < \tan^{-1} < \frac{\pi}{2}$. If a trigonomety problem does not specify the use of degrees, all values should be given in radians.

9. *Lattice points* are points all of whose coordinates are integers.

10. *Divisors* or *factors* of an integer refer to positive integers only. *Proper divisors* of an integer are those divisors that are less than the integer itself.

11. The designation *primes* refers to positive primes only. Note: 1 is a unit, not a prime.

12. If a problem refers to the digits of a number, those digits are usually underlined to distinguish the digits of a number from the product of those integers. Thus, we write: find the missing digits A and B if $K = \underline{A}\,\underline{2}\,\underline{5}\,\underline{B}$ and K is a multiple of 72. Here K is not the product $A \cdot 2 \cdot 5 \cdot B$.

13. If a diagram is given with a problem, it is not necessarily drawn to scale.

14. The *greatest lower bound* of a set is the largest number which is less than or equal to all the elements of the set, if such a number exists. Thus, 2 is the greatest lower bound for both $\{x : 2 < x\}$ and $\{x : 2 \le x\}$. The *least upper bound* of a set is the smallest number which is greater than or equal to all elements of the set, if such a number exists. Thus, 3 is the least upper bound for both $\{x : x < 3\}$ and $\{x : x \le 3\}$.

15. $\max\{a_1, a_2, \ldots, a_n\}$ denotes the largest element in a set and $\min\{a_1, a_2, \ldots, a_n\}$ denotes the least element in a set.