P U M ∴ C

PUMaC Conventions

- All Individual Test answers are nonnegative integers.

- Some Individual Test questions may ask you to concatenate the numerator and denominator of a fraction to produce an integer answer. For instance, if your answer is $101/1746$, you should submit the integer 1011746 as your answer.

- The words "compute," "find," or "evaluate" always call for an answer in simplest form, according to the usual mathematical consensus. (For instance, $9/6$, $4+3$, and $4\sin(30°)$ are unacceptable; $3/4$, 11, and $\sin(17°)$ are acceptable.) Justification is not necessary. When there's no mathematical consensus about which of several answers is "most simplified," any of them will be accepted: for example, $3/2$, $1\frac{1}{2}$, and 1.5 are all acceptable.

- When a question calls for an "ordered pair (a, b)," the answer must be given precisely in that form, including the parentheses and the comma. The same applies for other ordered n-tuples.

- When a polygon is named by letters, the letters are vertices occurring in their given order around the polygon. (For example, a polygon named $ABCDE$ is understood as a pentagon with vertices A, B, C, D, and E occurring in that order.) Unless otherwise specified, all polygons are non-degenerate (no angles of 0 or π) and non-self-intersecting, but not necessarily convex.

- Written numbers and logarithms are base 10 unless indicated otherwise by a subscript. The use of $\log(x)$ also implies that x is positive. For example, $\log_3 81 = 4$. Exception: $\ln(x)$ refers to $\log_e(x)$.

- The letter i is used for complex numbers, where $i^2 = -1$.

- Divisors (or factors) of an integer refer to positive integer divisors only. Proper divisors of an integer are divisors other than the integer itself.

- Prime numbers refers to positive primes only.

- Some problems refer to the digits of a number. In these cases the digits are usually underlined. For instance, in the question "Find the missing digits A and B if $k = \underline{A\,2\,5\,B}$ and k is a multiple of 72" ($k = 1000A + 200 + 50 + B$ where A is an integer between 1 and 9 and B is an integer between 0 and 9, and k is not (necessarily) the product of A, 2, 5, and B).

- The number of digits in a number does not count leading zeros. For example, $57 = 057$ is a two-digit number.

- Diagrams are not necessarily drawn to scale.

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

- The open interval bounded by real numbers a and b, $a < b$, is written (a, b), and the closed interval bounded by a and b, $a \le b$, is written $[a, b]$. Semi-open/semi-closed intervals are written $(a, b]$ or $[a, b)$.

- The sum of all the elements of the empty set is 0. Likewise, the product of all the elements of the empty set is 1.

- When a fraction is said to be written as $\frac{m}{n}$ in "simplest form," this means that m and n are relatively prime positive integers.