Official Common Dispute Document

- Geometry
  - Given a rectangle (with length L and width W), calculate the area of a surrounding border of **uniform** width x.
    - **Solution:** $2Lx + 2Wx + x^2 \cdot \pi$
- Algebra
  - The y, or x-intercept is to be interpreted as asking for the y (or x) coordinate (not the ordered pair).
- Pre-Calculus
  - All inverse trigonometric functions, unless otherwise stated, all denote the function with its **traditional** restricted range.
  - In regards to the phase shifts of trigonometric graphs, on team questions, answers should voice the shift that is **closest to** 0 (unless otherwise specified). That is to say, consider a team question that has one part that reads: $B =$ the phase shift of $\sin(x + P)$; the calculations for the correct answer ought to use $-P$ as the shift, not a positive coterminal shift. For individual questions, it would be prudent to specify the direction of the shift rather than using a positive or negative sign (e.g. P units to the left, versus $-P$).
- Calculus
  - Consider a function $f(x)$ whose derivative is greater than zero for all real values of x on the interval $[a, \infty)$, except for a single point at $x = b$ where the derivative is equal to zero. Is this function increasing on the interval (a, ∞) or $(a, b) \cup (b, \infty)$?
    - **Solution**: (a, ∞), because the definition for a function to increase on an interval is that for all a and b, $b > a$, on the interval, $f(b) > f(a)$, which the function described above obeys (assuming it is differentiable everywhere on the interval). However, $f(x)$ is not increasing at the point $x = b$.
  - $0^0 = 1$ (not "undefined") if asked in the form : "*What is* 0^0".
    - This question is only subject to be asked in the Calculus division.
    - Of course, in a limit-based context, a form of 0^0 may take on values other than 1.
  - When calculating the maximum error, use of differentials is not implied (the use of which must be stated within the question). In dispute, cite Taylor's theorem.
  - For those limits that approach ∞ or $-\infty$, the most correct answer choice is ∞ or $-\infty$, respectively. However, the answer "DNE", denoting "does not exist", is the second-most acceptable answer, given that $\pm\infty$ is not an answer choice. This term includes limits which do not exist because they do not satisfy equality of left-hand and right-hand limits, and limits which approach either ∞ or $-\infty$. That is, to answer the question:

    "Find $\lim_{x \to \infty} x$ " (which approaches infinity)

    with answer choices

    (A) 0 **(B)** 1 **(C)** ∞ **(D)** DNE **(E)** NOTA,

    the correct answer would be **(C)** ∞, and **(D)** DNE **would not** be accepted. However, with answer choices

    (A) 0 **(B)** 1 **(C)** 2 **(D)** DNE **(E)** NOTA,

    the correct answer would be **(D)** DNE.

    In short, the limit both approaches infinity and therefore "does not exist", but the answer of "infinity" is a better answer because it describes the nature of non-existence.
  - The notation for the nth derivative of the function $f(x)$ is to be written with parentheses surrounding the n.

    - **Correct Format:** $f^{(n)}(x)$
    - **Incorrect Format:** $f^n(x)$, *which is to be interpreted as the function raised to the nth power*
  - The integral of a function with more than one term is to be written with parenthesis.
  - A function which is not integrable on an interval A is not integrable on any interval B, where B contains A. I.e. no "the negative signs cancel" arguments.

- Statistics
  - Given a deck of cards, face cards only include Kings, Queens and Jacks (Aces are not included in the subset).
  - Consider a set of numbers ordered in increasing order. Calculate the IQR.
    - Even number of elements in the set:
      - **Solution:** Q1 is calculated based on the lower half of the set while Q3 is calculated based on the upper half.
    - Odd number of elements in the set:
      - **Solution:** Q1 and Q3 are calculated as stated above with the exclusion of the Q2 (median of the set).
  - A standard deck of cards is to be assumed as a standard 52-card deck.
  - A "die" is to be assumed as a fair 6-sided die unless otherwise stated.
  - Unless otherwise stated (or with information to suggest otherwise), a set of data is to be treated as a sample set.

- Number Theory
  - For a given integer, find the set of factors.
    - Positive Integer
      - **Solution:** The set of positive integral factors.
    - Negative Integer
      - **Solution:** The set of positive integral factors and -1.

- General/Overall
  - Concerning Pascal's triangle, the 'first row' is considered to be "Row 0", which is a 1.
  - A question involving possible rounding should specify and abide within the question; never round unless instructed to do so (exact answers).
  - A student should not have to assume what the test meant to say in the case of a misprint.
  - Unless there are parentheses, $\sum_b$ or $\prod$ notations only include the preceding terms that contain the counter-variable. Take $\sum_{k=a}^{b} k + c$ (or $\prod_{k=a}^{b} k + c$):
    - **Solution:** this is to be interpreted as

$$\sum_{k=a}^{b} k + c = [a + (a+1) + \cdots + (b-1) + b] + c.$$

      This is **not to be interpreted as** $[(a+c) + (a+c+1) + \cdots + (b-1+c) + (b+c)]$. The correct notation for the latter of these two expressions is

$$\sum_{n=a}^{b} (n+c) = [(a+c) + (a+c+1) + \cdots + (b-1+c) + (b+c)]$$