

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 $\lim_{x \rightarrow \infty} x$ ” (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 n th 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 n th 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_b 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

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

- When a question asks “which of the following” (referring to the answer choices), the phrase is to be taken as referring to choices **(A)**, **(B)**, **(C)**, and **(D)** only.