**Harold’s Illegals**

**Cheat Sheet**

18 August 2025

**Algebra**

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| **Function** | **What is Undefined?** | **When is it Defined?** | **Graph** |
|  | Division by zero (0)  (vertical asymptote) |  | Asymptote: Vertical, Horizontal & Oblique - Statistics How To |
|  | Division by zero (0) – special case  (hole at ) |  | Domain and Range of Rational Functions with Holes |
|  | Negative square roots |  | https://encrypted-tbn0.google.com/images?q=tbn:ANd9GcS0C2HH9fCQADYdodgzOm-A8RasQ6HD0VBXhQi4nb6Jy50eu0ow  *Domain:* [ |
|  | Negative even-powered roots |  | *Domain:* [ |
|  | Negative logarithms |  | https://encrypted-tbn1.google.com/images?q=tbn:ANd9GcSzhMLHvPv5qnKvCvjGegxPVd6TSJxtWIO8b6vNX3ojeYqHcB-LFQ  *Domain: (* |

**Trigonometry**

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| **Function** | **What is Undefined?** | **When is it Defined?** | **Graph** |
|  | Trig functions with division by zero when |  | https://encrypted-tbn1.google.com/images?q=tbn:ANd9GcQGpcj4cHM6jdEtlClniUWqaMiuxhwh6GllnQAVFm8cvuirt21w  *Domain: (* |
|  | Trig functions with division by zero when |  | http://www.regentsprep.org/Regents/math/algtrig/ATT7/otherg94.gif  *Domain: (* |
|  | Inverse trig functions where |  |  |
|  | Inverse trig functions where |  | http://www.regentsprep.org/Regents/math/algtrig/ATT7/otherg2.gif |

**Zero/Infinity**

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| **Number** | **What is Undefined?** | **When is it Defined?** |
| Zero (0)  Infinity (∞) |  |  |
| Infinity (∞) | Treating infinity like a number. |  |
| Proof | Given:  *a = b*  Proof:  *a* = *b*  *a2* = *a· b*  *a2 – b2* = *a· b – b2*  *(a* + *b) (a – b)* = *b (a – b)*  *a* + *b* = *b*  *b* + *b* = *b*  2*b* = *b*  2 = 1 | Can you find the illegal operation? |

NOTE: Illegal = [Undefined expression](https://en.wikipedia.org/wiki/Undefined_(mathematics)) per Wikipedia