**Harold’s**

**Graphing Rationals and Illegals**

**“Cheat Sheet”**

23 August 2022

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| **Graphing Rational Functions** | **How to Obtain** | |
|  | Reorder from highest to lowest degree/power | |
| Horizontal Asymptote (HA) | **Left:** | |
| Case 1: n > m |  |
| Case 2: n = m | (line) |
| Case 3: n < m |  |
| Slant Asymptote (SA) | Case 4: n = m+1 |  |
| Use synthetic or long division to determine | |
| y-intercept | **Right:** Plug in to get | |
| x-intercepts (roots) | **Top:** Factor to find roots of , check for holes | |
| Vertical Asymptotes (VA) | **Bottom:** Factor to find roots of , check for holes | |
| Domain | All except for VAs and holes | |
| Range | Depends upon Domain | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Function** | **When is it Undefined?** | **When is it Defined?** | **Domain** |
|  | Division by zero (0) |  |  |
|  | Hole at (uncommon) |  |  |
|  | Negative square roots |  | [ |
|  | Negative even roots |  | [ |
|  | Negative logarithms |  | ( |
|  | Trig functions with division by zero when |  | ( |
|  | Trig functions with division by zero when |  | ( |
|  | Inverse trig functions where |  |  |
|  | Inverse trig functions where |  |  |