Graphing Functions

Guidelines (4.5)

1. Find domain of $f$. (1.1)

2. Classify points of discontinuity (2.5)
   - removable (aka hole), jump, infinite, oscillatory, other

3. Find x- & y-intercepts. (Appendix C)

4. Look for symmetry.
   - $y$-axis, origin, other.

5. Find extrema: local or absolute. \( \{ \text{extrema} \} \subset \{ \text{critical} \} \) (Theorem 4.5)
   a. Find candidates for critical numbers. \( f' = 0 \) or \( f' = \text{DNE} \) (4.1)

   Candidates are critical #5s when they lie in \( \text{dom } f \).
   b. Determine sign $f'$ on intervals to see where $f$ increases/decreases. (4.3)

   Endpoints of intervals should include all candidates.

6. Find inflection points and concavity.
   a. Find candidates for inflection points. \( f'' = 0 \) or \( f'' = \text{DNE} \). (4.3)
   b. Determine sign of $f''$ on intervals to get concavity and

   inflection points.

   Endpoints of intervals should include all candidates.

7. Find asymptotes.
   a. Use #1s for infinite discont. (Step 2) to find vertical asymp.
      Determine \( \lim_{x \to \alpha^+} f \) and \( \lim_{x \to \alpha^-} f \).
   b. Find end behavior.
      \( y \approx \lim_{x \to \pm \infty} f(x) \Rightarrow y = \text{quotient} + 0 \)