Graph Sketching Summary Sheet

1. **Domain**
   legal x-values

2. **x, y – intercepts**
   - x-int: set \( f(x) = 0 \). Solve for \( x \).
   - y-int: plug in 0 for \( x \)

3. **Symmetry**:
   - Odd: \( f(-x) = -f(x) \), symmetric about the origin
   - Even: \( f(-x) = f(x) \), symmetric about the y-axis
   - Periodic: \( f(x + k) = f(x) \) for all \( x \), period is \( k \)

4. **Asymptotes**:
   - Vertical Asymptotes (forbidden x-values)
     - 0 in the denominator, ln(0), etc.
   - Horizontal Asymptotes:
     \[
     \lim_{{x \to \infty}} f(x) \quad \text{or} \quad \lim_{{x \to -\infty}} f(x)
     \]

5. **Increasing\|decreasing**
   - a) Take \( f'(x) \)
   - b) Find critical values
     \( f'(x) = 0 \) or \( f'(x) \) is undefined
   - c) Draw sign chart
     - \( f'(x) > 0 \Rightarrow f \) is increasing
     - \( f'(x) < 0 \Rightarrow f \) is decreasing

6. **Max/Min**
   Relative Extrema occur if:
   - 1) \( f'(x) \) changes sign at the point AND 2) \( f(x) \) is continuous at the point

7. **Concavity**
   - a) Take \( f''(x) \)
   - b) Find which \( x \)'s make \( f''(x) = 0 \) or \( f''(x) \) undefined
   - c) Draw a sign chart
     - \( f''(x) < 0 \Rightarrow f \) is concave down
     - \( f''(x) > 0 \Rightarrow f \) is concave up

8. **Inflection Points**
   Inflection points occur if:
   - 1) \( f''(x) \) changes sign at the point AND 2) \( f(x) \) is continuous at the point