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:
   
   \[- \lim_{x \to \infty} f(x)\]
   \[- \lim_{x \to -\infty} f(x)\]

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