

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:

$$-\lim_{x \rightarrow \infty} f(x)$$

$$-\lim_{x \rightarrow -\infty} f(x)$$

5. Increasing\decreasing

a) Take $f'(x)$

b) Find critical values

$$f'(x) = 0 \text{ or } f'(x) \text{ is undefined}$$

c) Draw sign chart

$$f'(x) > 0 \Rightarrow f \text{ is increasing}$$

$$f'(x) < 0 \Rightarrow f \text{ is decreasing}$$

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

$$-f''(x) < 0 \Rightarrow f \text{ is concave down } \text{☹️}$$

$$-f''(x) > 0 \Rightarrow f \text{ is concave up } \text{☺️}$$

8. Inflection Points

Inflection points occur if:

1) $f''(x)$ changes sign at the point **AND** 2) $f(x)$ is continuous at the point