Assignments for the week of 10/3:

- Read 2.5-2.6
- 45 minutes of Khan Academy
- Textbook assignment due Friday, 10/14:
  2.5 # 1-39 odd; 43, 47 - Implicit Differentiation
  2.6 # 15-27 odd, 35 - Related Rates

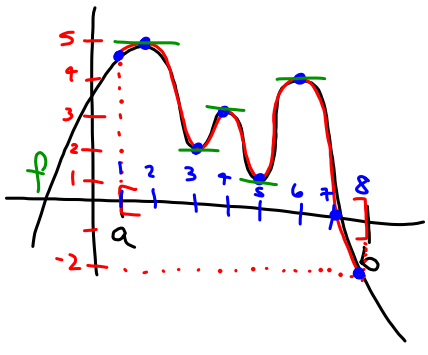
- Upcoming:

3.1 # 17-35 odd - Absolute Extrema on an Interval ✓
3.2 # 9-21 odd - Rolle's Theorem
3.2 # 33-45 odd - Mean Value Theorem
3.3 # 17-39 odd - Increasing, Decreasing, and Relative Extrema
3.4 #15-39 odd - Inflection Points and Concavity

optimization, Limits@∞, l'hopital's rule

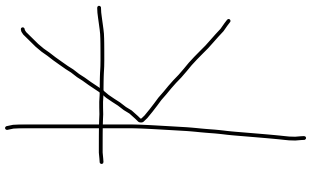
3.1 Extrema on an Interval

↳ maxima & minima
↳ relative & absolute



relative minima:
(3,2), (5,1)
relative maxima:
(2,5), (4,3), (6,4)
absolute maximum:
5 @ (2,5)
absolute minimum:
-2 @ (8,-2)

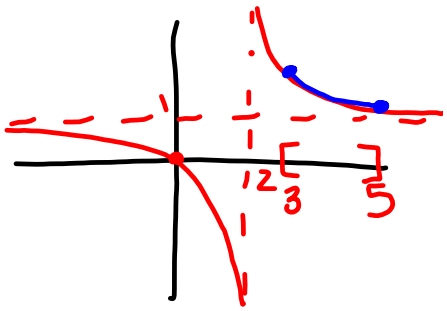
$f(x)$ has a relative maximum or minimum when $f'(x) = 0$. or $f'(x)$ is undefined.



We call such x-values **Critical #'s of f**.

3.1 Find the absolute max & min on the closed interval.

28. $h(t) = \frac{t}{t-2}$, $[3,5]$



$h'(t) = \frac{(t-2)(1) - t(1)}{(t-2)^2} = \frac{-2}{(t-2)^2}$

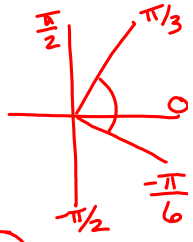
critical #'s: 2 (not in $[3,5]$ & hundef. @ 2)

$h(3) = \frac{3}{3-2} = 3$ ← absolute maximum of 3 that occurs when $x=3$

$h(5) = \frac{5}{5-2} = \frac{5}{3}$ ← absolute minimum of $5/3$ that occurs when $x=5$

30. $g(x) = \sec x$, $\left[\frac{-\pi}{6}, \frac{\pi}{3}\right]$

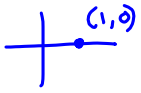
Find the absolute max & min on the closed interval.



$g'(x) = \sec x \tan x = \frac{1}{\cos x} \cdot \frac{\sin x}{\cos x}$

critical #'s: $\sin x = 0$ @ $x = 0$

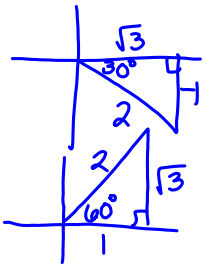
$\cos x \neq 0$ in $\left[-\pi/2, \pi/3\right]$



$g\left(\frac{-\pi}{6}\right) = \sec\left(\frac{-\pi}{6}\right) = \frac{2}{\sqrt{3}}$

$g(0) = \sec(0) = 1$ ← abs. min

$g\left(\frac{\pi}{3}\right) = \sec\left(\frac{\pi}{3}\right) = 2$ ← abs. max.



$1 < 3 < 4$

$\sqrt{1} < \sqrt{3} < \sqrt{4}$

$1 < \sqrt{3} < 2$

$1 > \frac{1}{\sqrt{3}} > \frac{1}{2}$

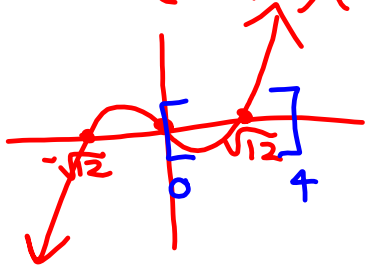
$2 > \frac{2}{\sqrt{3}} > 1$

22. $f(x) = x^3 - 12x$, $[0, 4]$

Find the absolute max & min on the closed interval.

$f(x) = x(x^2 - 12)$

$= x(x - \sqrt{12})(x + \sqrt{12})$



$f'(x) = 3x^2 - 12$

critical #'s:

$3(x^2 - 4) = 0$

$x = \pm 2$

$f(0) = 0^3 - 12(0) = 0$

$f(2) = 2^3 - 12(2) = 8 - 24 = -16$ ← abs min

$f(4) = 4^3 - 12(4) = 4(16 - 12) = 16$ ← abs max