Math 1210-3
Tuesday March 4

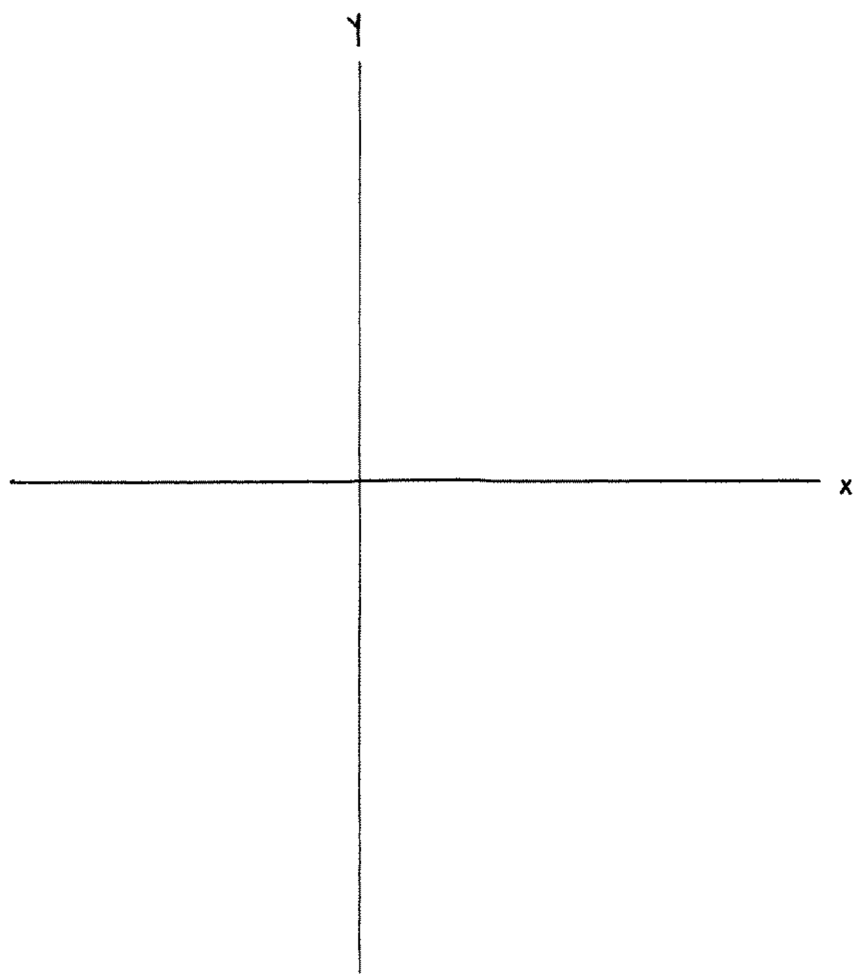
Webworks 6 is open!
§3.1-3.5
due date Thurs March 13

Recall
- local/global extrema
- critical pts
- INC/DEC
- CU/CD

Exercise 1 (left-over from Monday)

Use first and 2nd derivative information to graph $y = x^4 - 2x^3$.

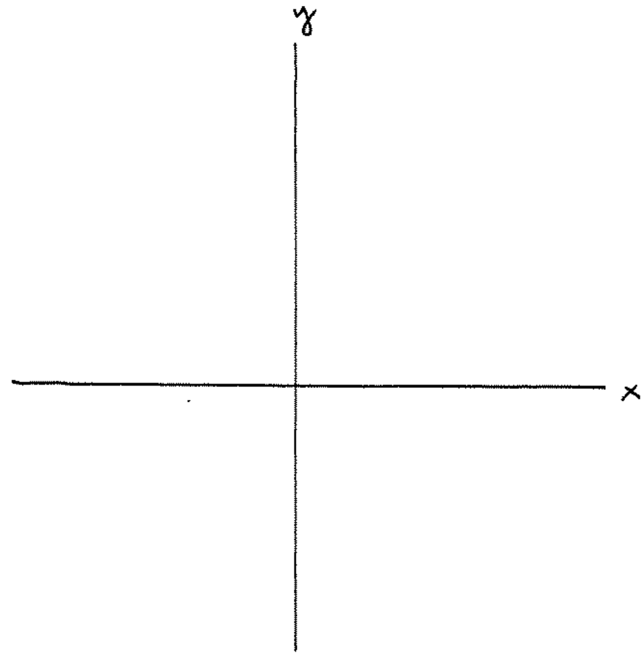
Identify
- inc/dec intervals
- CU/CD intervals
- critical pts.
- inflection pts (where concavity changes)
- local extrema



Exercise 2 (an old friend). As in Exercise 1, collect concavity, INC/.

and graph $y = x^2 + 6x + 10$.

Compare this way of graphing parabolas to completing the square and translating.



Exercise 3 For the graph $y = x^{4/3} - 4x^{1/3}$, identify

inc/dec intervals

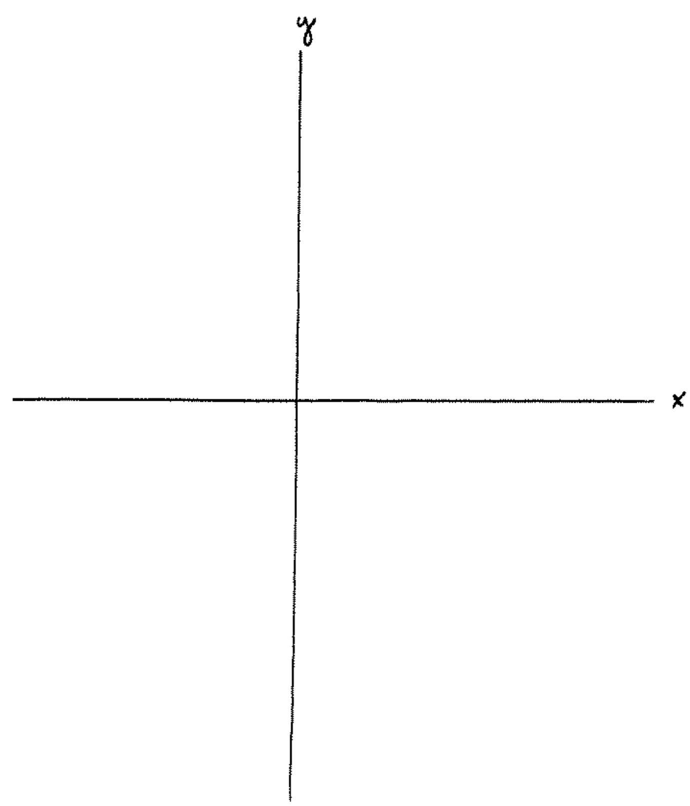
critical pts

local extrema

inflection pts

CU/CD intervals

and graph!



With the previous examples, and our previous thms that for f continuous on $[a,b]$ and

$$
\left.\begin{array}{l}
f' > 0 \text{ on } (a,b) \Rightarrow f \text{ INC on } [a,b] \\
f' < 0 \text{ on } (a,b) \Rightarrow f \text{ DEC on } [a,b] \\
f'' > 0 \text{ on } (a,b) \Rightarrow f' \text{ INC on } [a,b] \Rightarrow f \text{ CU on } [a,b] \\
f'' < 0 \text{ on } (a,b) \Rightarrow f' \text{ DEC on } [a,b] \Rightarrow f \text{ CD on } [a,b].
\end{array}\right\} \text{(assuming } f' \text{ cont on } [a,b])
$$

We can verify the following tests for critical points

If c is a critical point for f, and if near c we have

st rivative test:

sign f' $\;\; \overset{+++\;\; ---}{\underset{c}{\longleftarrow\!\!|\!\!\longrightarrow}}$ then $f(c)$ is local MAX

sign f' $\;\; \overset{---\;\; +++}{\underset{c}{\longleftarrow\!\!|\!\!\longrightarrow}}$ then $f(c)$ is local MIN

2^{nd} deriv. test (If f'' is continuous at $x=c$, you just need to check $f''(c)$.):

sign f'' $\;\; \overset{+++}{\underset{c}{\longleftarrow\!\!|\!\!\longrightarrow}}$ then $f(c)$ is local min


CU

sign f'' $\;\; \overset{---}{\underset{c}{\longleftarrow\!\!|\!\!\longrightarrow}}$ then $f(c)$ is local max


CD

Exercise 4 Check that the first & 2^{nd} derivative tests work in Exercises 1, 2 (and if you have time, 3)