3.6 day 1 - Curve Sketching with $f'(x)$ 12/10/18

## Homework:

- 3.6A
- Quiz 3.1, 3.3, 3.4, 3.6 - Wednesday, 12/12/18


## Objective:

Sketch curves of a function given graph of f'(x)

## Do Now:

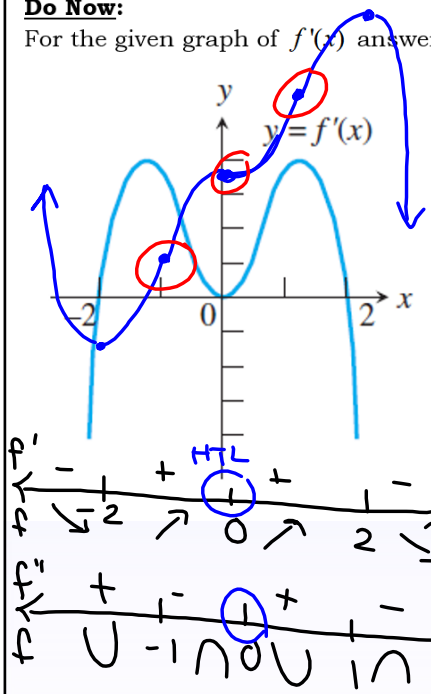
Work with a partner on the Do Now question.

You will have approximately 6 minutes.

0:06:00

**Do Now:**

For the given graph of $f'(x)$ answer the following questions. Then, sketch a possible graph of $f(x)$.




a) intervals on which $f(x)$ is increasing $(-2,0)\cup(0,2)$

b) intervals on which $f(x)$ is decreasing $(-\infty,-2)\cup(2,\infty)$

c) relative maximum of function at $x=$ $2$

d) relative minimum of function at $x=$ $-2$

e) intervals on which $f(x)$ is concave up $(-\infty,-1)\cup(0,1)$

f) intervals on which $f(x)$ is concave down $(-1,0)\cup(1,\infty)$

g) points of inflection for $f(x)$ at $x=$ $\approx -1,0,1$

f' incr f''>0

f' decr f''<0

f'' changes sign

f' incr → decr

## Summary

*f(x) inreasing:* $f' > 0$

*f(x) decreasing:* $f' < 0$

*Relative max occurs on f(x):* $f' > 0 \to f' < 0$, $f' = 0$ & $f'' < 0$

*Relative min occurs on f(x):* $f' < 0 \to f' > 0$, $f' = 0$ & $f'' > 0$

*Absolute max/min:* Open interval – f entirely decr $\rightleftarrows$ incr
Closed interval – Comp y values

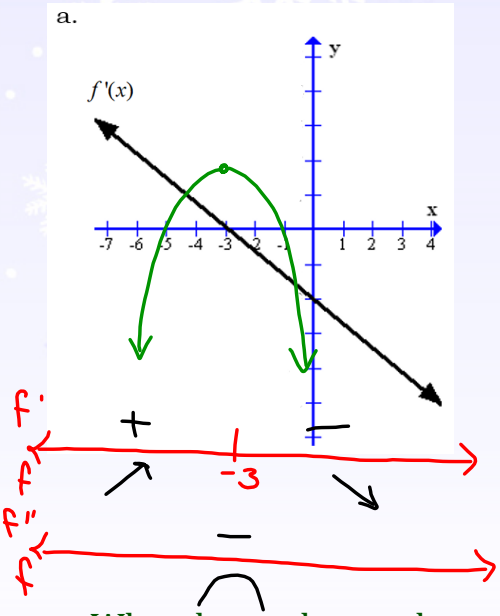
*f(x) concave up:* $f'' > 0$, $f'$ incr

*f(x) concave down:* $f'' < 0$, $f'$ decr

*POI occurs on f(x):* $f''$ changes sign, $f'$ incr $\rightleftarrows$ decr

1. Using the graph of $f'(x)$, analyze the graph of the continuous function $f(x)$. Then, sketch a possible graph of $f(x)$.

a.




Incr: $(-\infty, -3)$, $f' > 0$

Decr: $(-3, \infty)$, $f' < 0$

Ext: $x = -3$, Abs max
f entirely incr → decr

Conc up: none

Conc down: $(-\infty, \infty)$ $f'' < 0$
$f'$ decr

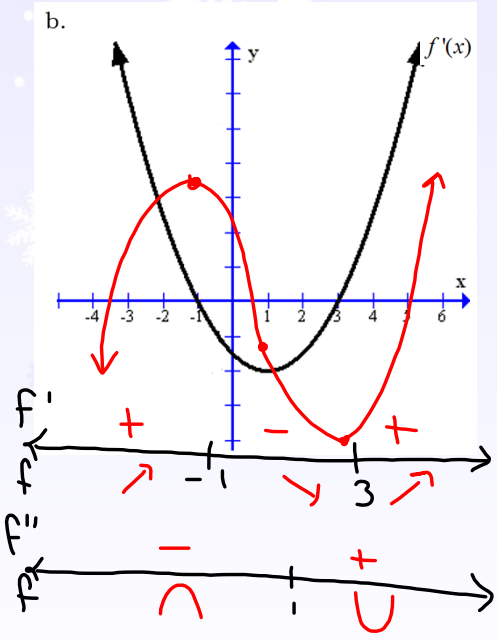
What do you know about $f''(x)$? What does that tell you about $f(x)$?

What we know about the $y$-values?

NO POI

1. Using the graph of $f'(x)$, analyze the graph of the continuous function $f(x)$.
Then, sketch a possible graph of $f(x)$.

b.




Incr: $(-\infty,-1) \cup (3,\infty)$ $f'>0$

Decr: $(-1,3)$ $f'<0$

Extrema: $x=-1$ Rel max
$x=3$ Rel min

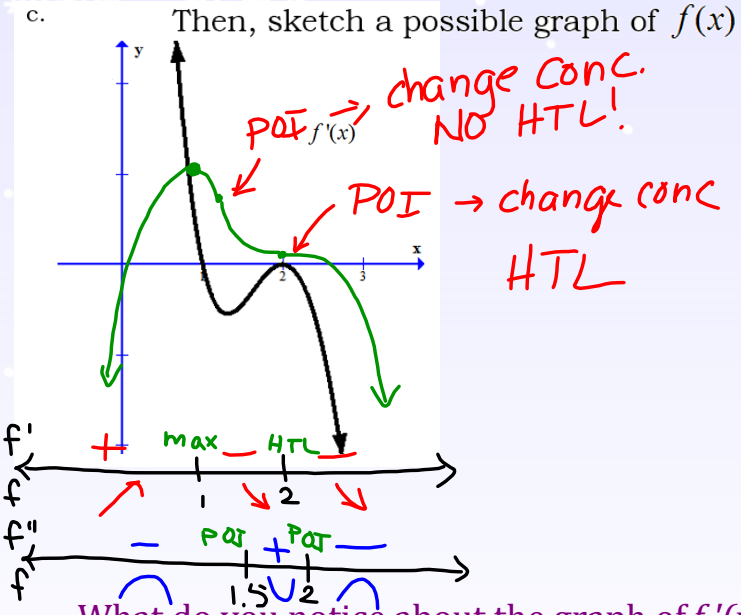
Conc up: $(1,\infty)$ $f''>0$ $f'$ incr

Conc down: $(-\infty,1)$ $f''<0$ $f'$ decr

POI: $x=1$ $f''$ change sign

1. Using the graph of $f'(x)$, analyze the graph of the continuous function $f(x)$.
Then, sketch a possible graph of $f(x)$.

c.

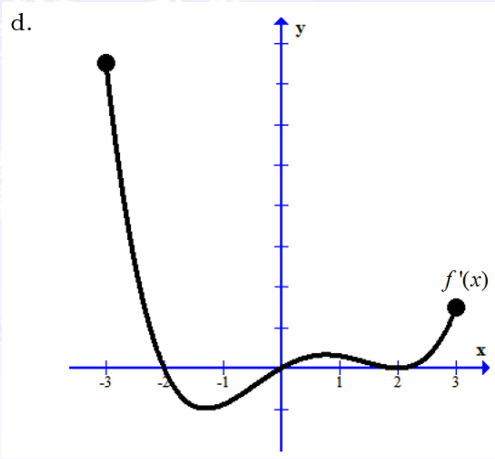



What do you notice about the graph of $f'(x)$ when POI occur on $f(x)$?

What is different about the POI at $x = 1.5$ and 2?

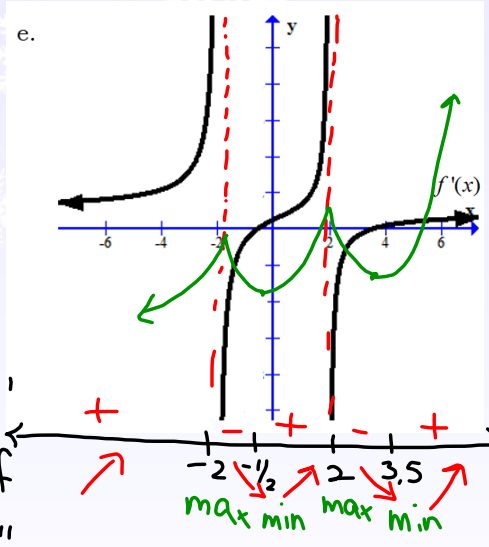
1. Using the graph of $f'(x)$, analyze the graph of the continuous function $f(x)$. Then, sketch a possible graph of $f(x)$.

d.

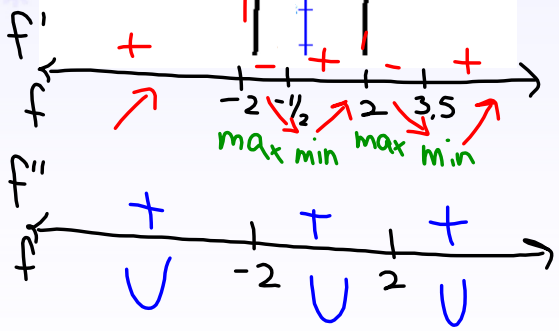



1. Using the graph of $f'(x)$, analyze the graph of the continuous function $f(x)$. Then, sketch a possible graph of $f(x)$.

e.




Domain f(x) $(-\infty,\infty)$







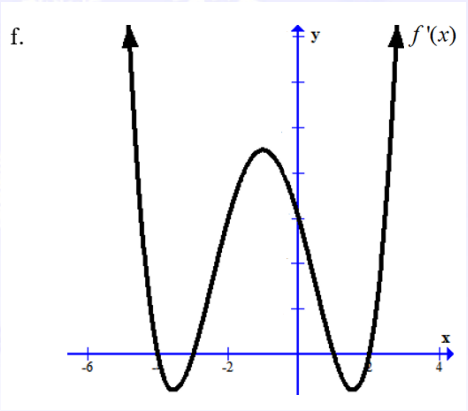
conc up: $(-\infty,-2)\cup(-2,2)\cup(2,\infty)$

f' incr

NO POI

1. Using the graph of $f'(x)$, analyze the graph of the continuous function $f(x)$. Then, sketch a possible graph of $f(x)$.

f.




## Think-Pair-Share

1. Draw the graph of the derivative of some function. (Label clearly!)

2. Exchange your graph with a partner.

3. Sketch a possible graph of the function using your partner's derivative graph.

4. Exchange back and check their work.

5. Talk out the solutions!