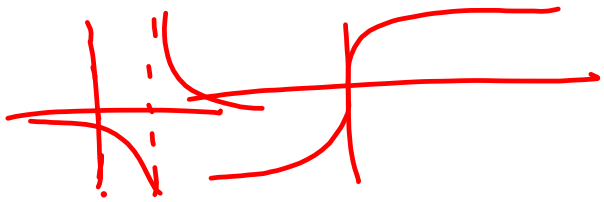
16. $\frac{dy}{dx} = \frac{y-2x}{4-x}$



(a)

(b) y has a vertical asymptote @ $x=4$

(c) $y=2x$ $\quad x^2+4y=xy$

$x^2+4(2x)=x(2x)$

$x^2+8x=2x^2$

$0=x^2-8x$

$0=x(x-8)$

~~$x=0$~~, $x=8$

$(8,16)$

$4y-xy=x^2 \qquad x^2+4y=xy$

$y=\frac{-x^2}{4-x}$

$\frac{dy}{dx}=\frac{(4-x)(2x)+x^2(-1)}{(4-x)^2}$

$=\frac{2x^2-8x-x^2}{(4-x)^2}$ $\quad x^2-8x=0$

$x(x-8)=0$

$x=8$

(d) $\frac{d^2y}{dx^2}=\frac{(4-x)(y'-2)-(y-2x)(-1)}{(4-x)^2}\Big|_{\substack{x=8\\y=16\\y'=0}}$

$=\frac{1}{2}>0$

$\Rightarrow y$ is concave up ∪

hence $(8,16)$ is a local minimum.

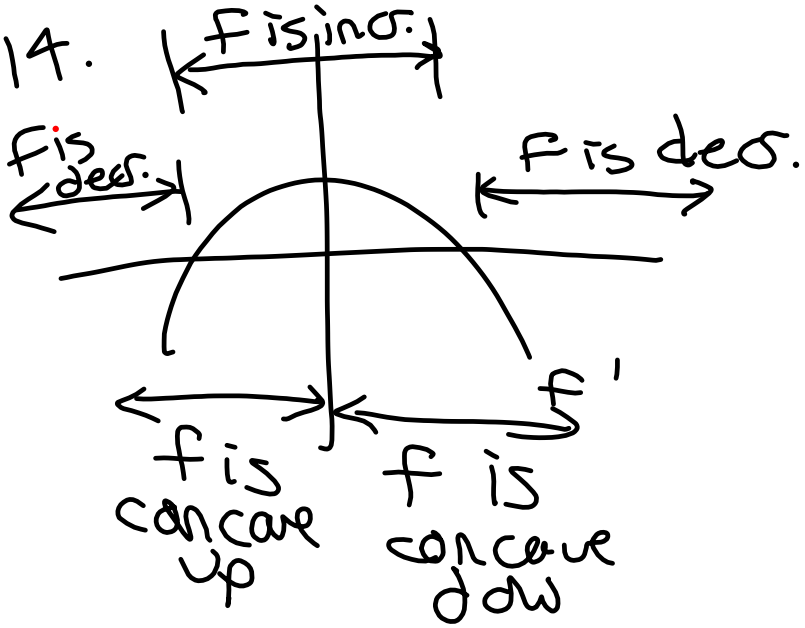
$$g''(x) = \begin{cases} -3/2, & x < -2 \\ 3/2, & -2 < x < 0 \\ -1/2, & x > 0 \end{cases}$$

$g'(-1) = -0.5$ $g''(-1) = 3/2$

$g'(1) = 0.5$ $g''(1) = -1/2$

1. E
2. D
3. E
4. C
5. E
6. B
7. A
8. C
9. D
10. A
11. A
12. A
13. A
14. E
15. C

14.

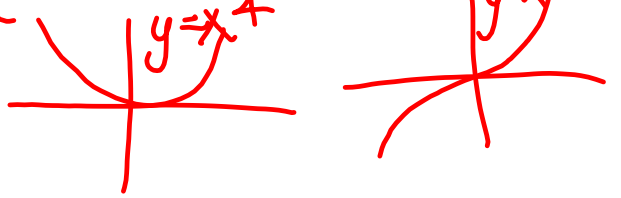


f'	f
+	inc.
−	decr.

$f'(x)=0$ or undef.
critical #'s
relative extrema
or f is undef.

f''	f'	f'
+	inc.	conc. up
−	decr.	concave down

$f''(x)=0$ @ extreme solutions
inflection points



13. $f(x) = x\sqrt{2x-3}$

$$f'(x) = 1\cdot\sqrt{2x-3} + x\,\frac{1}{2\sqrt{2x-3}}\cdot 2$$

$$= \frac{2x-3}{\sqrt{2x-3}} + \frac{x}{\sqrt{2x-3}}$$

12. $x^2+y^2=25$

$$2x+2yy'=0$$

$$2yy' = -2x$$

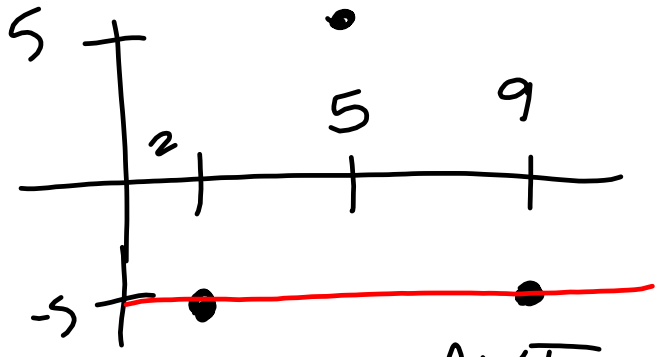
$$y' = \frac{-x}{y}\Big|_{(4,3)} = \frac{-4}{3}$$

$$\frac{d^2y}{dx^2} = y'' = \frac{y(-1)-(-x)y'}{y^2}$$

$$= \frac{3(-1)-(-4)\left(\frac{-4}{3}\right)}{3^2} =$$

$$= \frac{-3-\frac{16}{3}}{9} = \frac{-9-16}{3}\cdot\frac{1}{9}$$

$$= -25/27$$



$\frac{f(9)-f(2)}{9-2}=0$

$f(2)=f(9)$

Rolle's Theorem

$f(a)=f(b)$

MVT

If f cts on $[a,b]$ & diff on (a,b)

$f'(c)=\frac{f(b)-f(a)}{b-a}$

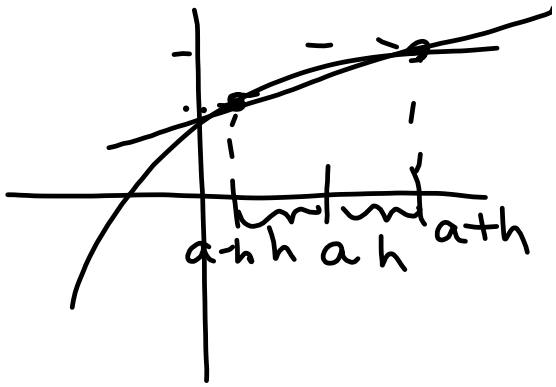
$y=f(x)$

$f'(2)$

nDeriv

$h=0.001$

$\frac{f(a+h)-f(a-h)}{2h}$



$nDeriv(fw, x, 0.00001)\Big|_{x=5}$

$y = x^5$

$d(x^5, x)\Big|_{x=4} = 5(4)^4$

$nDeriv(x^5, x, 0.001)\Big|_{x=4}$

$= \dfrac{(4+h)^5 - (4-h)^5}{2h}\Big|_{h=0.001}$

$= \dfrac{(4+0.01)^5 - (4-0.01)^5}{2(0.01)}$

Lab due Wed.

HW due Fri