Exam Part 2 Wed 12/18

Do Now

$f(x)=x^3-3x^2-24x+8$

1) Find the critical numbers of f(x)

2) Find the open intervals on which the function is increasing or decreasing.

3) Locate all relative extrema

① $f'(x)=3x^2-6x-24$

$0=3(x^2-2x-8)$

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

$x=4$ | $x=-2$

② f' + −2 − 4 +

↑ $(-\infty,-2)\cup(4,\infty)$

↓ $(-2,4)$

③ rel min = −72 (4, −72)

rel max = 36 (−2, 36)

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Determine the intervals where the function is increasing and decreasing.

$$y=\frac{x^2-1}{x}$$

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

$$=\frac{2x^2-x^2+1}{x^2}=\frac{x^2+1}{x^2}$$

↙ dy/dx = 0

← dy/dx dne

*critical #'s occur when f'(x) = 0 or f'(x) dne

$x^2+1=0$

$\sqrt{x^2}=\sqrt{-1}$

$x=\pm i$

no c.v.

$\sqrt{x^2}=\sqrt{0}$

$x=0$

$f'(x)$ + 0 +

↑ $(-\infty,0)\cup(0,\infty)$

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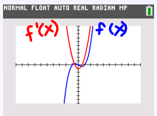
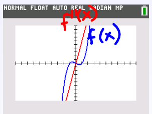
Graphs of derivatives

$f(x)=x^3-x$

a) find f'(x) and sketch a graph of both f(x) and f'(x) on the same set of axes.

b) find f''(x) and sketch a graph of both f(x) and f''(x) on the same set of axes.





relative max: highest point in relation to surrounding points
relative min: lowest point in relation to surrounding points
Concavity: curvature of the graph. Concave up: curved up (holds liquid), concave down: curved down (liquid would spill).
Point of inflection: point where concavity changes.

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If $f'(x)=(x+2)(x-3)$

1) Where is f(x) ↑ ↓? 1st deriv test

2) concave up? concave down? 2nd deriv. test

3) Any P.O.I'S?

1) $f'(x)$ + −2 − 3 +

↑ $(-\infty,-2)\cup(3,\infty)$

↓ $(-2,3)$

2) $f'(x)=(x+2)(x-3)$

$=x^2-x-6$

$f''(x)=2x-1$

$0=2x-1$

$x=\frac{1}{2}$

$f''(x)$ − $\frac{1}{2}$ +

Concave down $(-\infty,\frac{1}{2})$

concave up $(\frac{1}{2},\infty)$

Point of inflection when $x=\frac{1}{2}$

Dec 13-10:00 AM