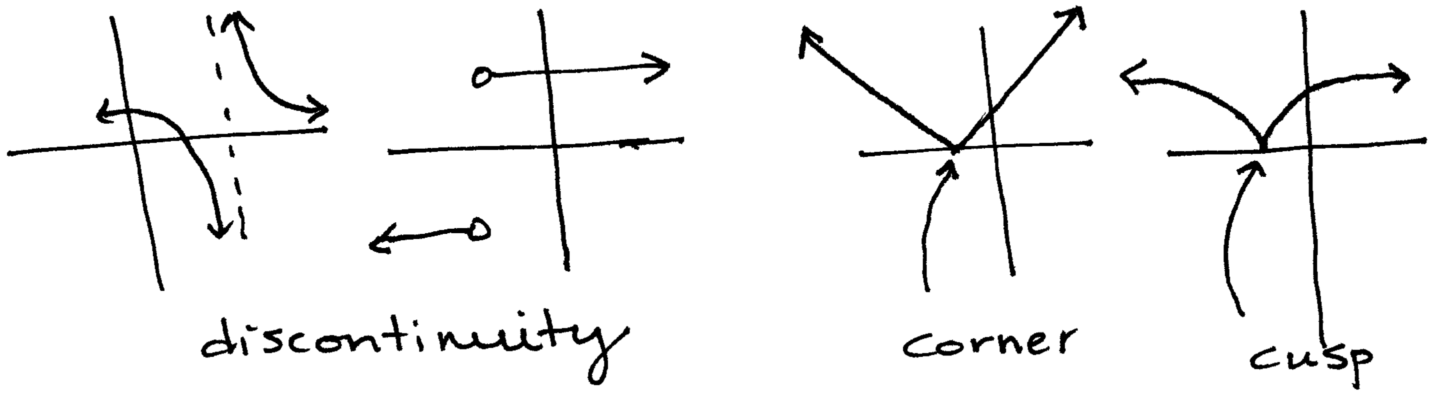
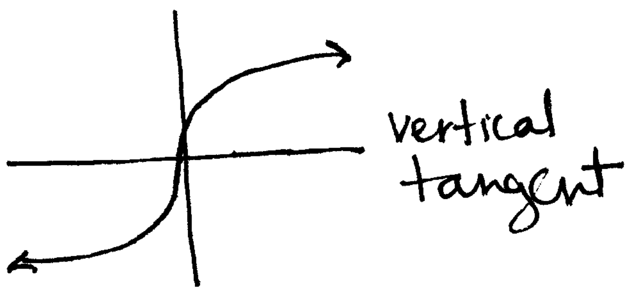
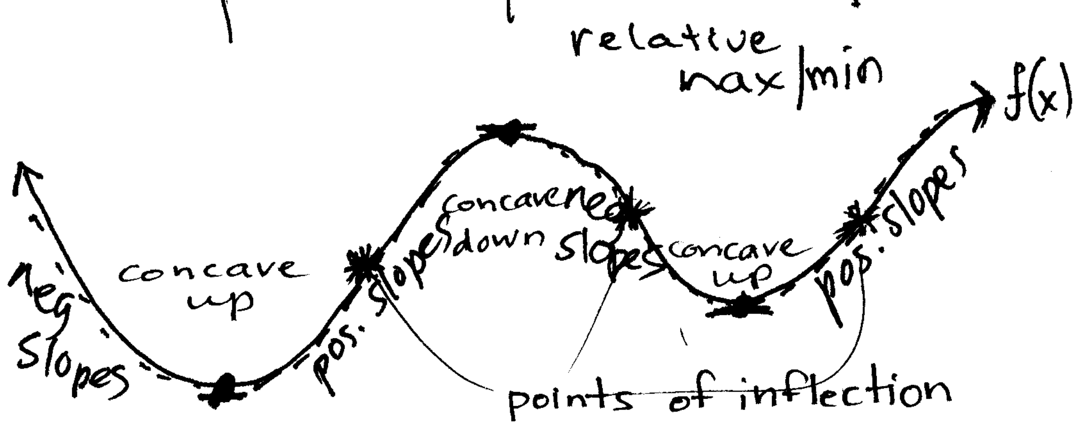
When does a derivative fail to exist?





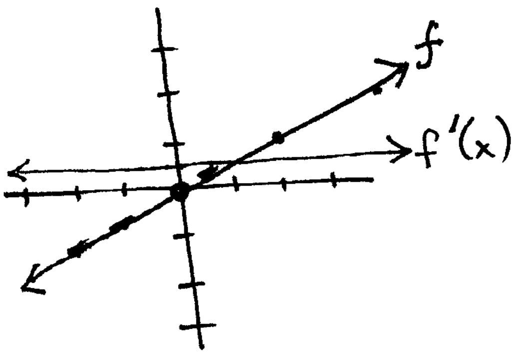
* If f is "differentiable" (can find the derivative) at $x = c$, then f is continuous at $x = c$.

slopes of tangents	deriv. value	original function	graph of deriv.
pos	pos	Increasing	above x-axis
neg	neg	decreasing	below x-axis
zero	0	change in incr/decr	possible zeros for deriv.



2^{nd} deriv.	original function
pos	concave up
neg	concave down
0	possible P.O.I

Ex 1 $f(x) = \frac{1}{2}x$. Sketch $f'(x)$



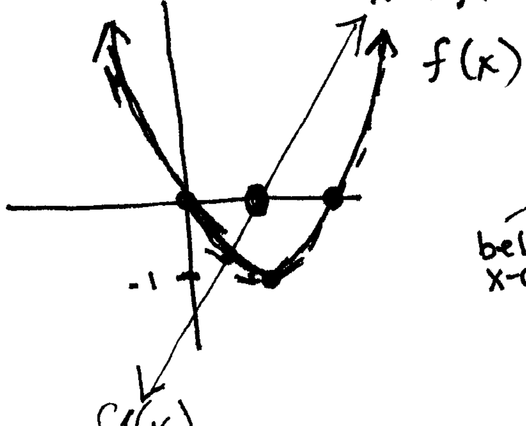
tang. lines — pos slope, constant $\left(\frac{1}{2}\right)$

above x-axis

Ex 2 $f(x) = x^2 - 2x$. Sketch $f'(x)$.

$x(x-2)=0$

$x=0,\ x=2$



tang. lines

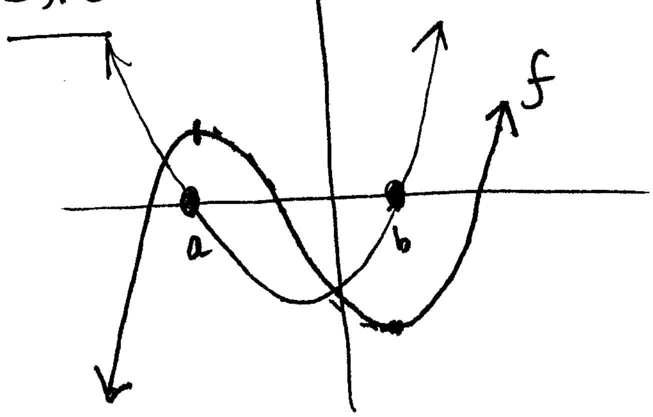
neg until $x=1$

below x-axis

pos $(1,\infty)$

above x-axis

EX 3 Sketch $f'(x)$.



tang. line slopes

pos $(-\infty, a)$

neg (a, b)

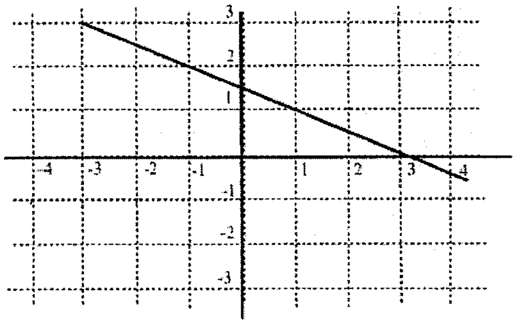
pos (b, ∞)

deriv. cross x-axis at a & b

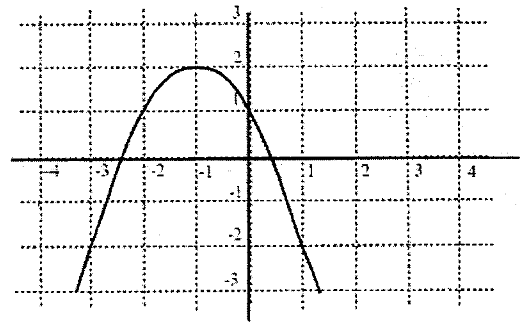
Calculus AB Unit #2
Introduction to Derivatives: Graphical Analysis

In Exercises 1–8, sketch a graph of the derivative function for each of the given functions.

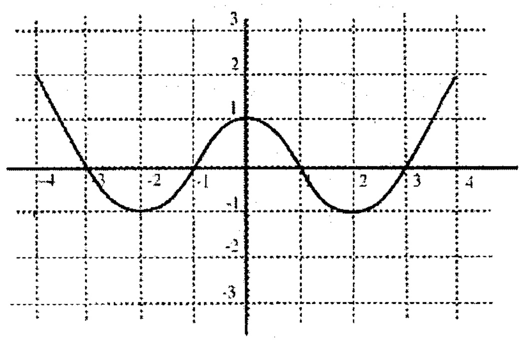
1.



2.



3.



4.

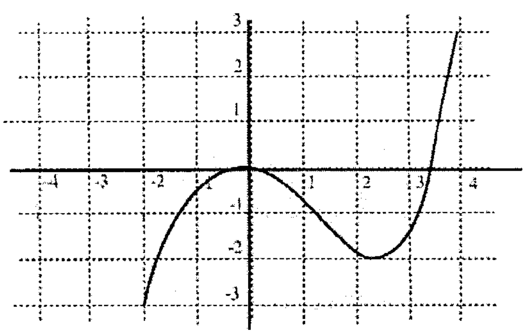
tang. lines

pos $(-\infty, -2)$

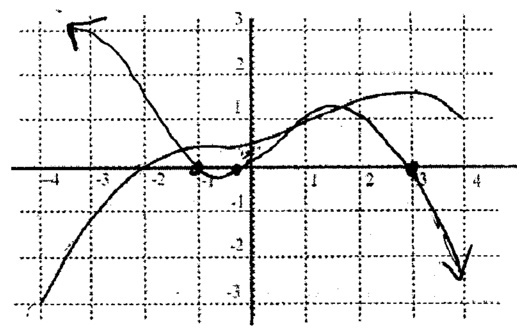
neg $(-2$, close to 0 ?$)$

neg $($close to 0 ?$, \infty)$

5.



6.



tang lines

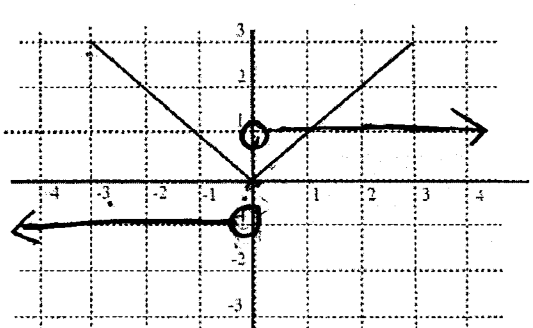
pos $(-\infty, -1)$

neg $(-1, -\frac{1}{3})$

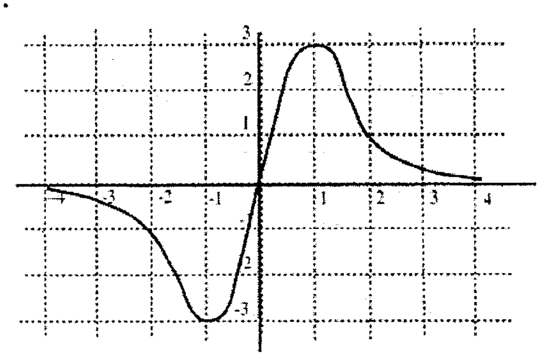
pos $(-\frac{1}{3}, 3)$

neg $(3, \infty)$

7.



8.



6

tangent lines

neg $(-\infty, 0)$ constant (-1)

pos $(0, \infty)$ contant (1)