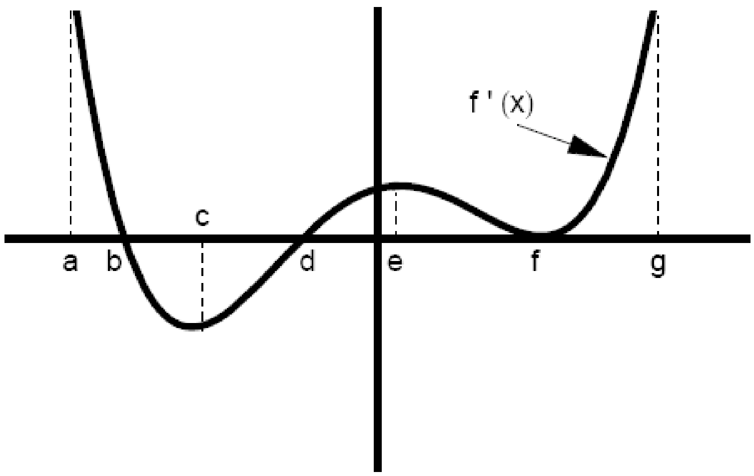
More of L H E
3.3

Use the graph of f '(x) below to answer the questions about f(x). Note that the graph is of f '(x), the derivative of f(x), and **not** of f(x).

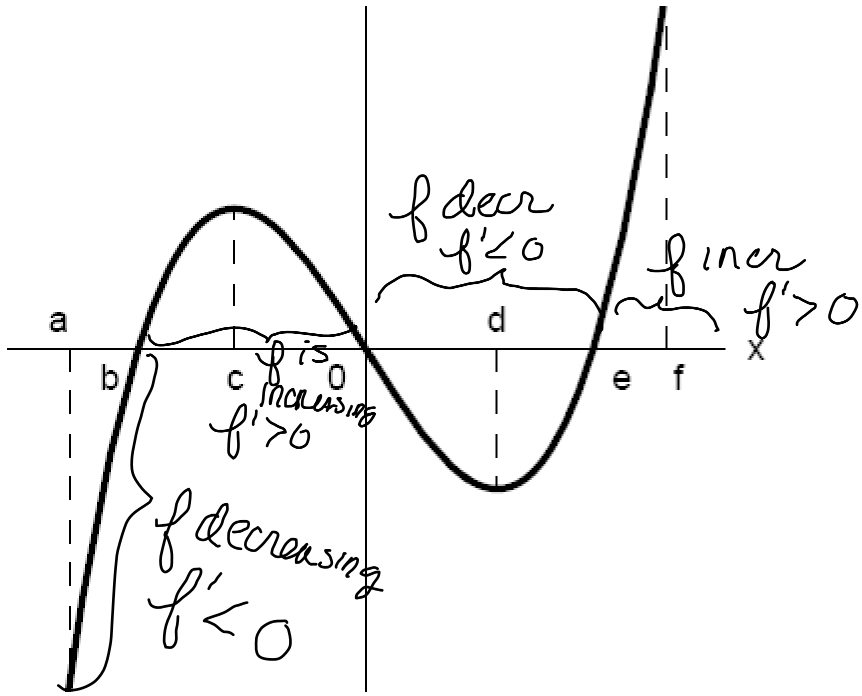


From: http://www.frapanthers.com/teachers/zab/ABCalculusTests.htm

Based on the graph of $f'(X)$ shown above find where the graph of $f(X)$ is increasing or decreasing AND find the x-values of any relative extrema.

f is increasing $< x < f$), d $a<x<b$,
$f<x<g$ because $f'>0$ on these
intervals f is decreasing on $b<x<d$
because $f'<0$ on this intervals
at $x=b$ f' changes from positive to
negative values Hence f has a rel max at
$x=b$. at $x=d$ f' changes from
negative to positive hence f has a
rel min at $x=d$

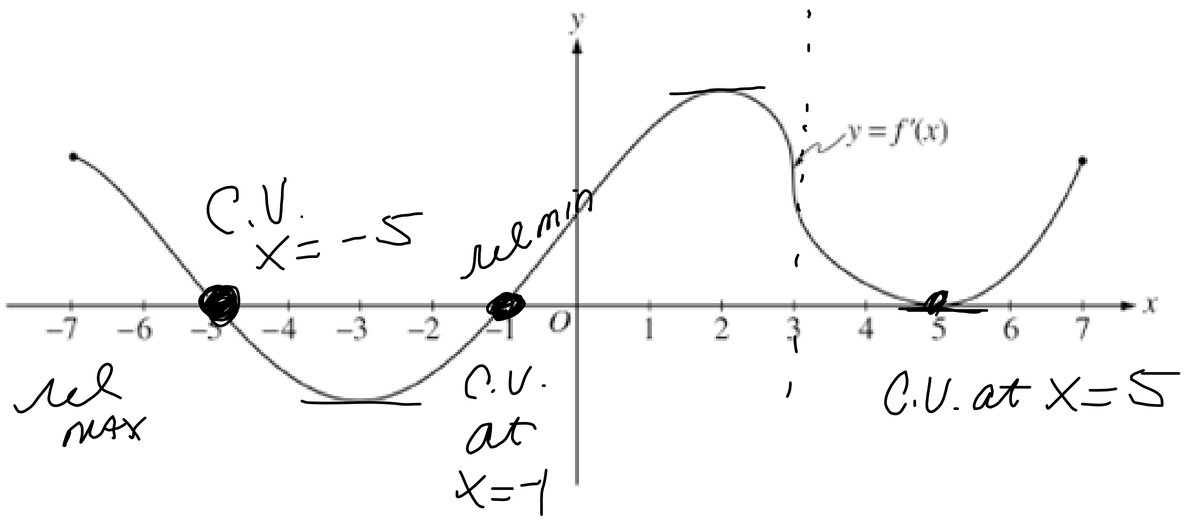
Let $y = f'(x)$ be the graph shown below



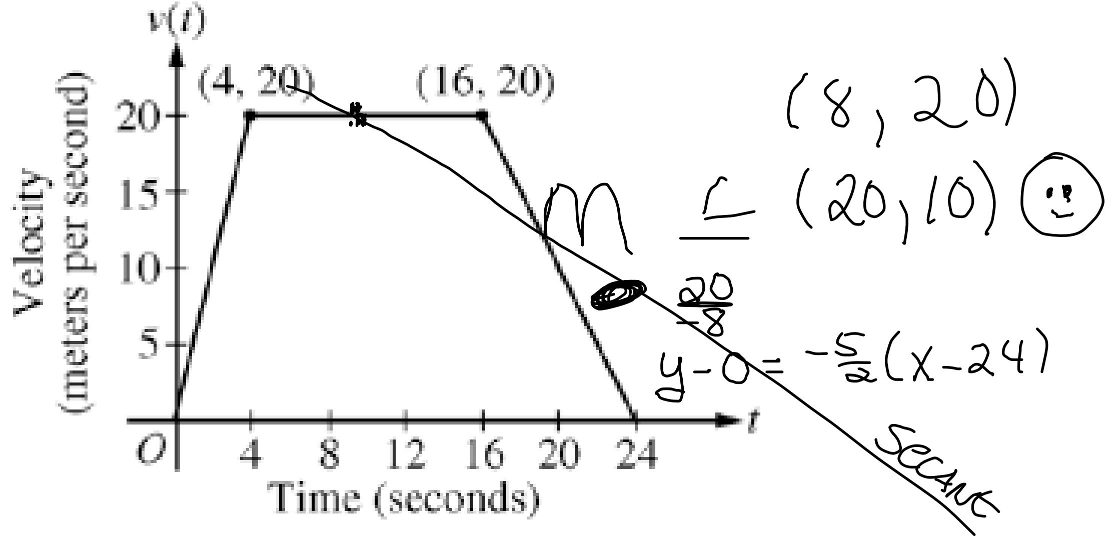
Based on the graph of $f'(x)$ shown above find where the graph of $f(x)$ is increasing or decreasing AND find the x-values of any relative extrema.

at $x = b$ and $x = e$ f' changes from negative to positive values Hence f has a rel min at $x = b$, $x = e$

at $x = 0$ f' changes from positive to negative values Hence f has a rel max at $x = 0$



The figure above shows the graph of f', the derivative of the function f, for $-7 \le x \le 7$. The graph of f' has horizontal tangents lines at $x = -3$, $x = 2$, and $x = 5$ and a vertical tangent at $x = 3$. Find all relative extrema on the open interval $-7 < x < 7$. Justify completely.



A car is traveling on a straight road. For $0 \leq t \leq 24$ seconds, the car's velocity $V(t)$, in meters per second, is modeled by the piecewise-linear function defined by the graph above.

Find the average rate of change of V over the interval $8 \leq t \leq 20$. Does the Mean Value Theorem guarantee a value of c, $8 < c < 20$, such that $V'(c) = a(c)$ is equal to this average rate of change? Why or why not?

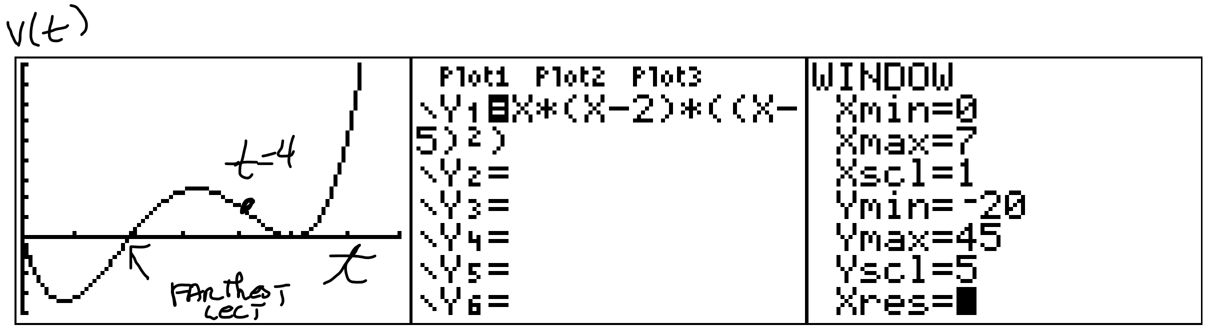
AV R OF Δ on [8,20] $= \dfrac{v(20) - v(8)}{20 - 8}$ $\dfrac{\frac{m}{sec}}{sec}$

SAME AS $\frac{m}{sec}$ $= -\dfrac{5}{6}\ \dfrac{m}{sec^2}$

MVT DOES NOT APPLY BECAUSE v(t) IS NOT DIFF at t=16

A dog is observed running up and down a garden path. The function below models the dog's velocity.

$$v(t) = t(t-2)(t-5)^2$$



At t = 0, the dog is directly in front of the door. [Let's consider the door to be "the origin"]

Describe the motion of the dog on the path.

On $0 < t < 2$ Mook moves LEFT because $v(t) < 0$ on this interval. On $2 < t < 5$ and $5 < t < 7$ Mook moves RIGHT because $v(t) > 0$.
Mook changed directions at $t = 2$ because $v(t)$ changes FROM NEG TO POS AT $t = 2$

Is the speed of the dog increasing or decreasing at t = 4?

Since $v(4) > 0$ and $v'(4) = a(4) < 0$
then Mook's speed is decreasing at time $= 4$

Homework: pages 186, 187 # 47, 49, 51 [use your TI and follow the directions], 61, 63 [Make sure that you include the graphs]