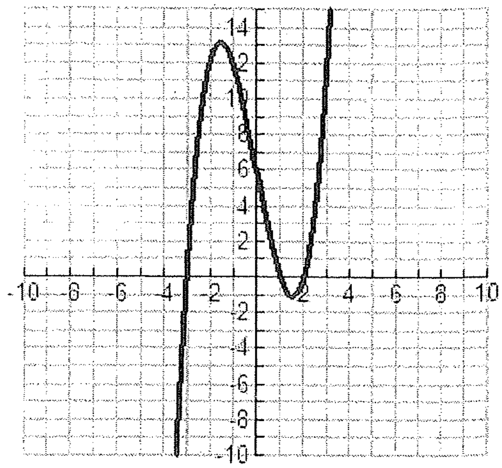
WKST4.3

Our Chapter 3 Group Project Key

[Feel free to use your TI but remember to show all work]

1. The graph of the derivative, $f'(x)$, of a continuous function f is shown below.



graph of $f'(x)$

(a) Based on the graph above, where does the graph of $f(x)$ have critical values? $f'=0$, $f'=$ und $X=-3, X=1, X=2$

(b) On what interval(s) is the graph of f increasing? Explain fully.

$[-3,1]$ $[2,\infty)$

when f' is greater than 0, or where f' graph lies above x-axis

(c) On what interval(x) is the graph of f decreasing? Explain fully.

$(-\infty,-3]$

$[1,2]$

when f' is less than 0, or where f' graph lies below x-axis

$f(x)=(1-x)^{1/2}$ Find the value of c that satisfies the Mean Value Theorem for the function $f(x)=\sqrt{1-x}$ for the interval $[-8, 1]$

$f(1)=\sqrt{1-1}=0$

$f(-8)=\sqrt{1--8}=\sqrt{9}=3$

① Slope of endpoints $\dfrac{f(b)-f(a)}{b-a}=\dfrac{f(1)-f(-8)}{1--8}=\dfrac{0-3}{9}=\dfrac{-1}{3}$

② find $f'(x)$. $=\frac{1}{2}(1-x)^{-1/2}\cdot -1$

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

③ Set equal/solve. $-\dfrac{1}{3}=\dfrac{-1}{2\sqrt{1-x}}$ $\rightarrow 3=2\sqrt{1-x}$

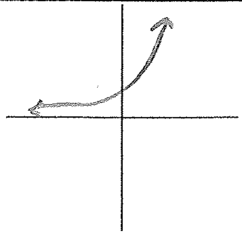
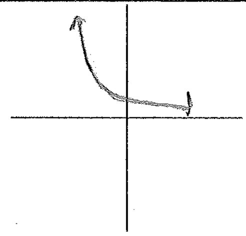
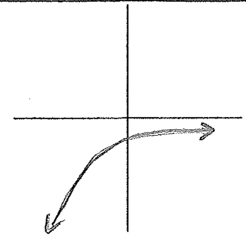
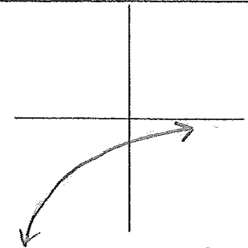
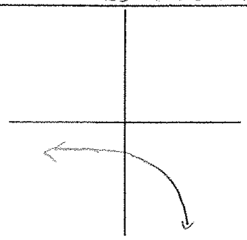
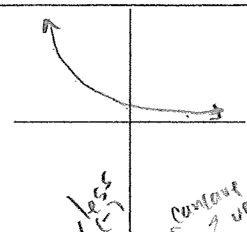
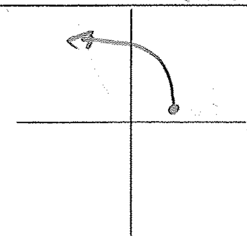
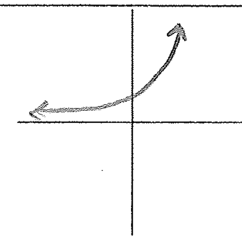
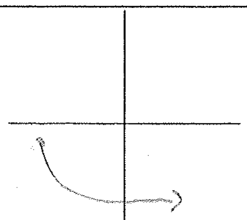
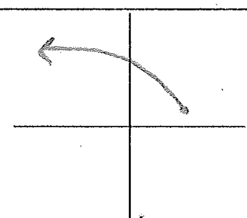
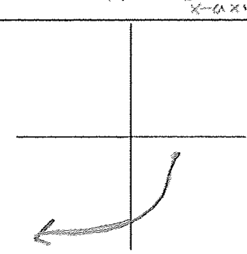
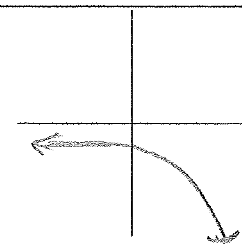
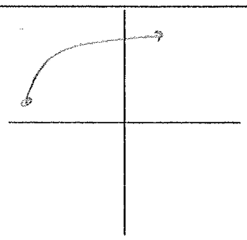
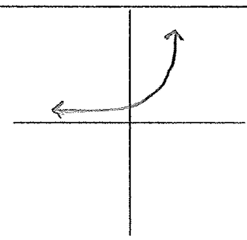
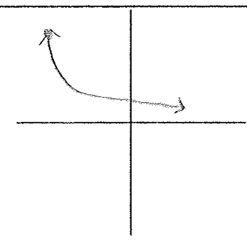
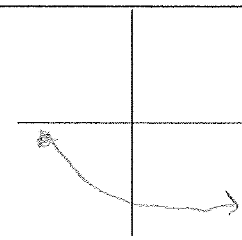
$\frac{3}{2}=\sqrt{1-x}$

$\frac{9}{4}=1-x$

$\frac{5}{4}=-x$

$X=-\frac{5}{4}$ $\boxed{c=-\frac{5}{4}}$

In each of the following situations, sketch the graph of a function $f(t)$ that has the indicated properties.

			
$f(t)$ is increasing $f(t) > 0$ above x-axis $f'(t)$ is increasing less (−) concave up	$f(t) > 0$ above x-axis $f(t)$ is decreasing $f''(t) > 0$ concave up	$f(t)$ is increasing $f''(t) < 0$ concave down $f(t) < 0$ below x-axis	$f''(t) < 0$ concave down $f'(t) > 0$ always increasing $f(t) < 0$ below x-axis
			
$f(t) < 0$ below x-axis $f'(t)$ is decreasing $f'(t) < 0$	less (−) concave up $f'(t)$ is increasing $f(t) > 0$ above x-axis $f'(t) < 0$ decreasing	$f'(t) < 0$ decreasing $f''(t) < 0$ concave down $f(t) > 0$ above x-axis	$f(t)$ is increasing $f(t) > 0$ above x-axis $f''(t) > 0$ concave up
			
$f'(t)$ is increasing concave up $f(t)$ is decreasing $f(t) < 0$ below x-axis	$f(t) > 0$ above x-axis $f(t)$ is decreasing $f'(t)$ is decreasing concave down	$f(t) < 0$ below x-axis $f'(t)$ is increasing concave up $f(t)$ is increasing	$f''(t) < 0$ concave down $f(t) < 0$ below x axis $f(t)$ is decreasing
			
$f(t) > 0$ above x-axis $f(t)$ is increasing $f''(t) < 0$ concave down	$f'(t) > 0$ increas $f(t) > 0$ above x $f''(t) > 0$ concave up	$f'(t) < 0$ decr $f''(t) > 0$ concave up $f(t) > 0$ above x-axis	$f(t) < 0$ below x-axis $f''(t) > 0$ concave up $f'(t) < 0$ decreasing

f incr
$f' > 0$
f' decreasing