AP Calculus
5.3 Review

Name_____

1. If the graph of $f(x)=\frac{2}{3}x^3-\frac{kx^2}{2}$ has a point of inflection at x=1, find the value of k.

$f'(x)=2x^2-kx$

$f''(x)=4x-k$

$0=4-k$

$k=4$

2. State when the function given below is concave up/down and point(s) of inflection. Justify your answers.

$f(x)=\frac{x^4}{12}-\frac{x^3}{6}-3x^2+x$

$f'(x)=\frac{x^3}{3}-\frac{x^2}{2}-6x+1$

$f''(x)=x^2-x-6$

$x^2-x-6=0$

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

f'' P -2 N 3 P

$(-2,-34/3)$ $(3,-87/4)$

f(x) has points of inflection $(-2,-34/3)$ & $(3,-87/4)$ b/c $f''(x)=0$ @ $x=-2$ & 3 and $f''(x)$ changes signs @ $x=3,-2$.

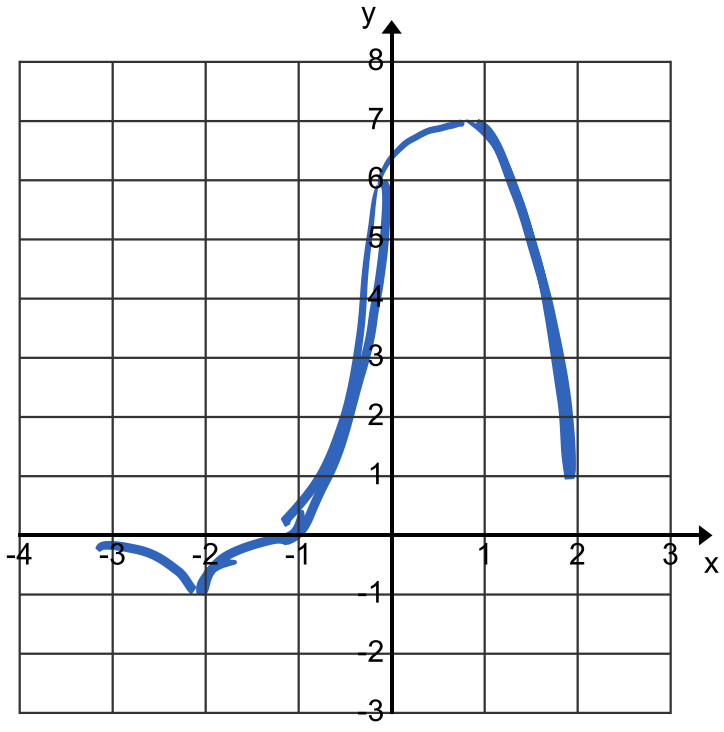
f(x) is CCU $(-\infty,-2)\cup(3,\infty)$ b/c $f''(x)>0$ on $(-\infty,-2)\cup(3,\infty)$

f(x) is CD $(-2,3)$ b/c $f''(x)<0$ $(-2,3)$

3. Given $f(x)$ is continuous on the interval $[-3,2]$ graph $f(x)$ on the interval $[-3,2]$ with the following properties.

$f(-3)=0$ $f(-2)=-1$ $f(-1)=0$ $f(0)=6$ $f(1)=7$ $f(2)=1$

x	-3<x<-2		-2	-2<x<-1	-1	-1<x<0	0	0<x<1	1	1<x<2
$f'(x)$	–		und	+	+	+	+	+	0	–
$f''(x)$	–		und	–	0	+	0	–	–	–



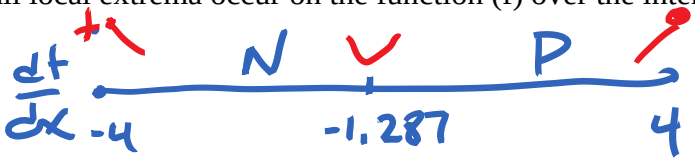
4. Given the position of a particle moving along a horizontal axis is $x(t)=3\cos(0.8t-2)$ from $-0.5\le t\le 1.5$. Determine if there is a time(s) when the average velocity equals the instantaneous velocity over the interval $-0.5\le t\le 1.5$.

use your calculator! $\frac{x(-0.5)-x(1.5)}{-0.5-1.5}=x'(t)$

$t\approx -.038 \quad t\approx 1.112$

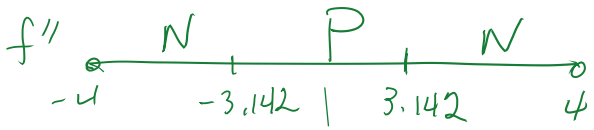
5. Given $\frac{df}{dx}=-5\sin(0.5x-\pi)+3$ find:

a. Find where all local extrema occur on the function (f) over the interval $[-4,4]$ and justify your answer.



- f(x) has a local max @ x=-4 b/c x=-4 is an endpt & f'<0 to the right of x=-4
- f(x) has a local min @ x=-1.287 b/c f' goes from − to + @ x=-1.287
- f(x) has a local max @ x=4 b/c x=4 is an endpt & f'>0 to the left of x=4

b. Determine when the graph of the function (f) will be concave up and concave down on the interval $[-4,4]$. Justify your answer.



f(x) is ccd $(-4,-3.142)\cup(3.142,4)$ b/c f''<0 on the interval

f(x) is ccu $(-3.142,3.142)$ b/c f''>0 on the interval.

c. Determine the x-coordinate of all points of inflection on the function (f) on the interval $[-4,4]$ and justify your answer.

f(x) has a p.o.i @ x=-3.142 & x=3.142

b/c f''(x) changes signs @ x=-3.142 & 3.142.