CALC I
Ch. 4 Quiz

Name: Key
Date:

I. Graph the following, showing all work for every part listed.

1. $y = \dfrac{x-1}{x+3}$ Asymptotes: 1st Derivative: 2nd Derivative:

VA: $x = -3$

HA: $y = 1$

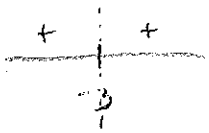
$y' = \dfrac{(x+3)-(x-1)}{(x+3)^2}$

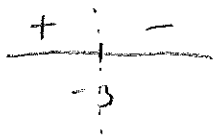
$y' = 4(x+3)^{-2}$

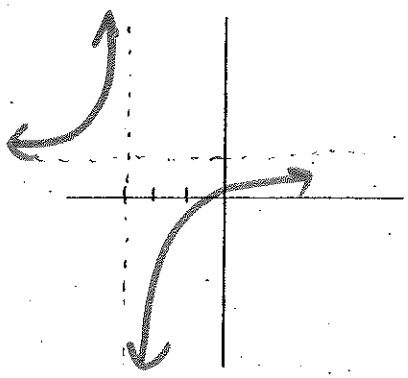
$y'' = -8(x+3)^{-3}$

$0 = \dfrac{4}{(x+3)^2}$

$0 = \dfrac{-8}{(x+3)^3}$







2. $y = \dfrac{x+2}{x-1}$ Asymptotes: 1st Derivative: 2nd Derivative:

VA: $x = 1$

HA: $y = 1$

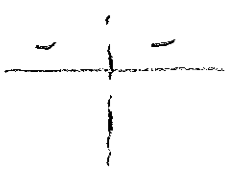
$y' = \dfrac{(x-1)-(x+2)}{(x-1)^2}$

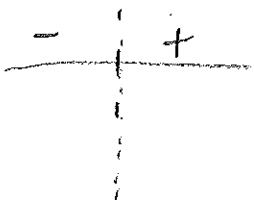
$y' = -3(x-1)^{-2}$

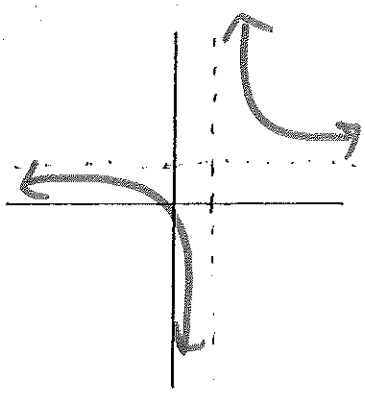
$y'' = 6(x-1)^{-3}$

$0 = \dfrac{-3}{(x-1)^2}$

$0 = \dfrac{6}{(x-1)^3}$







II. Pick 1 of the following

3. $y = \frac{x^2-3}{x-2}$ Asymptotes:

VA: $x=2$

SA: $y=x+2$

2 | 1 0 −3
2 4
1 2 1

1st Derivative:

$y' = \frac{(x-2)(2x) - (x^2-3)}{(x-2)^2}$

$0 = \frac{x^2-4x+3}{(x-2)^2}$

$0 = (x-3)(x-1)$

$x=3$ $x=1$

+ − − +

1 2 3

max min

(1,2) (3,6)

2nd Derivative:

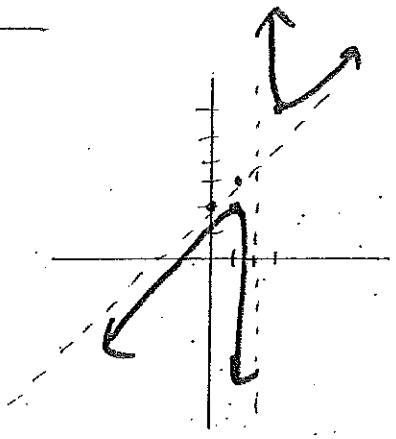
$y'' = \frac{(x^2-2)(2x-4) - (x^2-4x+3)(2(x-2))}{(x-2)^4}$

$2x^3 - 4x^2 - 4x + 8 - 2x^2 + 8x - 6$

$0 = \frac{2x^3 - 6x^2 + 4x + 2}{(x-2)^3}$

− +

2



4. $y = \frac{x}{x^2-1}$ Asymptotes:

VA: $x = \pm 1$

HA: $y = 0$

1st Derivative:

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

$0 = \frac{-x^2-1}{(x^2-1)^2}$

− − −

−1 1

2nd Derivative:

$y'' = \frac{(x^2-1)^2(-2x) + (-x^2-1)(2(x^2-1)(2x))}{(x^2-1)^4}$

$-2x^3 + 2x + 4x^3 + 4x$

$0 = \frac{2x^3+6x}{(x^2-1)^3}$

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

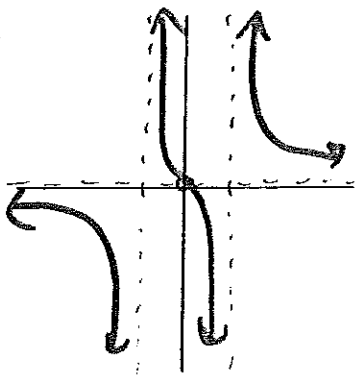
$x=0$ ∅

− + − +

−1 0 1

IP

(0,0)



Chapter 4 Quiz
Calc 1

Name: Key
Date:

I. Find all of the relevant information. You do not have to graph. You do not have to find the ordered pairs for min, max, or IP.

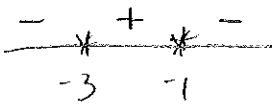
1. $f(x)=1-9x-6x^2-x^3$

$f'(x) = -9 - 12x - 3x^2$

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

$0 = -3(x+1)(x+3)$

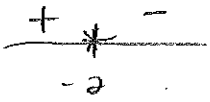
$x=-1 \quad x=-3$



$f''(x) = -12 - 6x$

$0 = -12 - 6x$

$x = -2$



a.) Increasing $[-3,-1]$
b.) Decreasing $(-\infty,-3) \cup [-1,\infty)$
c.) Min $x=-3$
d.) Max $x=-1$
e.) Concave Up $(-\infty,-2)$
f.) Concave Down $(-2,\infty)$
g.) IP $x=-2$

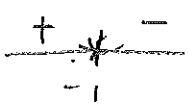
2.) $f(x)=1-(x+1)^3$

$f'(x) = -3(x+1)^2$

$x=-1$

$f''(x) = -6(x+1)$

$x=-1$



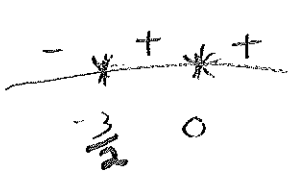
a.) Increasing —
b.) Decreasing $(-\infty,\infty)$
c.) Min —
d.) Max —
e.) Concave Up $(-\infty,-1)$
f.) Concave Down $(-1,\infty)$
g.) IP $x=-1$

3.) $f(x)=x^4+2x^3$

$f'(x) = 4x^3 + 6x^2$

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

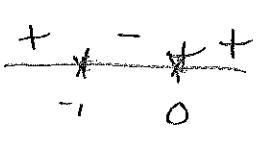
$x=0 \quad x=-\frac{3}{2}$



$f''(x) = 12x^2 + 12x$

$0 = 12x(x+1)$

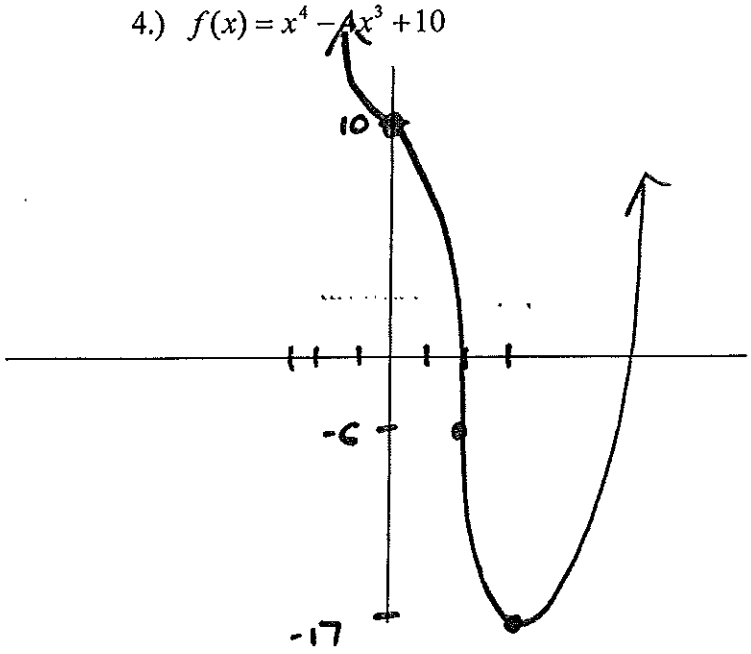
$x=0 \quad x=-1$



a.) Increasing $(-\frac{3}{2},\infty)$
b.) Decreasing $(-\infty,-\frac{3}{2}]$
c.) Min $x=-3/2$
d.) Max —
e.) Concave Up $(-\infty,-1) \cup (0,\infty)$
f.) Concave Down $(-1,0)$
g.) IP $x=-1, \; x=0$

II. Graph the following, finding all relevant information.

4.) $f(x) = x^4 - 4x^3 + 10$



a.) Increasing $[3, \infty)$
b.) Decreasing $(-\infty, 3]$
c.) Min $(3, -17)$
d.) Max —
e.) Concave Up $(-\infty, 0) \cup (2, \infty)$
f.) Concave Down $(0, 2)$
g.) IP $(0, 10)$, $(2, -6)$

$f'(x) = 4x^3 - 12x^2$

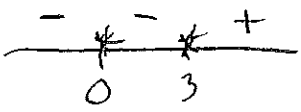
$0 = 4x^2(x-3)$

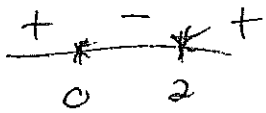
$x = 0$ | $x = 3$

$f''(x) = 12x^2 - 24x$

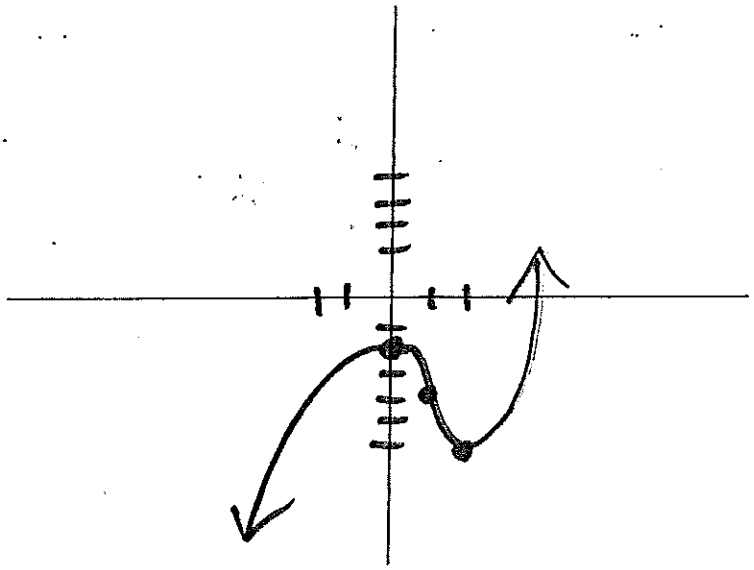
$0 = 12x(x-2)$

$x = 0$ | $x = 2$





5.) $f(x) = x^3 - 3x^2 - 2$



a.) Increasing $(-\infty, 0] \cup [2, \infty)$
b.) Decreasing $[0, 2]$
c.) Min $(2, -6)$
d.) Max $(0, -2)$
e.) Concave Up $(1, \infty)$
f.) Concave Down $(-\infty, 1)$
g.) IP $(1, -4)$

$f'(x) = 3x^2 - 6x$

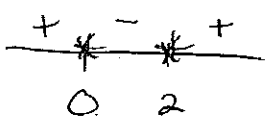
$0 = 3x(x-2)$

$x = 0$ | $x = 2$

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

$0 = 6x - 6$

$x = 1$



Bonus $\frac{x^2}{x^2-1}$

Chapter 4 Quiz
Calc 1

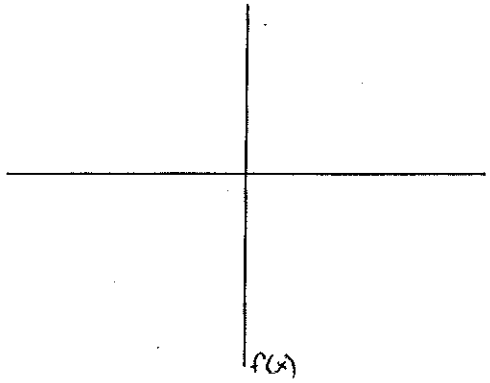
Name:
Date:

I. Sketch the graphs of f(x) given the following

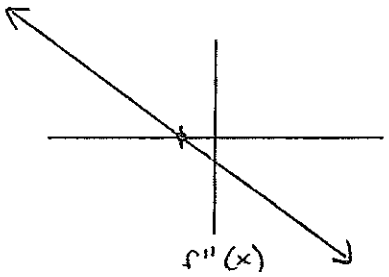
1. f(-2) = 0
   f(0) = -3
   f(2) = 0
   f(-1) = -1
   f(1) = -1

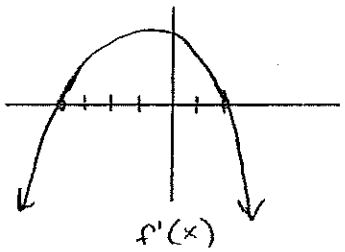
   f '(x) = 0 when x = -2,0,2
   f '(x) < 0 when –2<x<0 , x>2
   f '(x) > 0 when x<-2 , 0<x<2

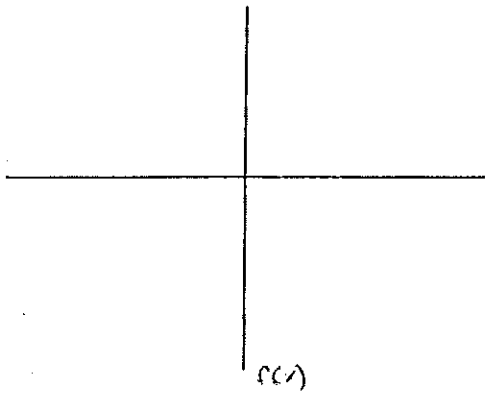
   f "(x) = 0 when x = -1,1
   f " (x) < 0 when x<-1 , x>1
   f " (x) > 0 when –1<x<1



2. f(-4) = -4
   f(-1) = 2
   f(2) = 7







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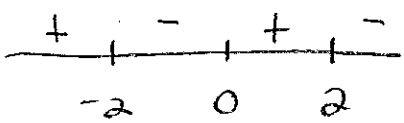

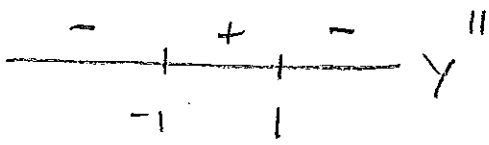

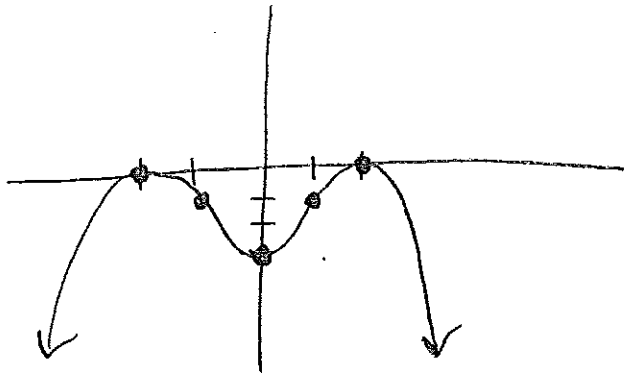

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