Pre-Calculus
Exam Review
Sections 2.5 – 2.8
Modeling Functions

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NO CALC!

1) For each of the following, find the domain, range, asymptotes (H/V/Slant), removable discontinuities, limits at all asymptotes, x & y intercepts, and sketch a graph.

a) $y = \frac{2x}{x-3}$

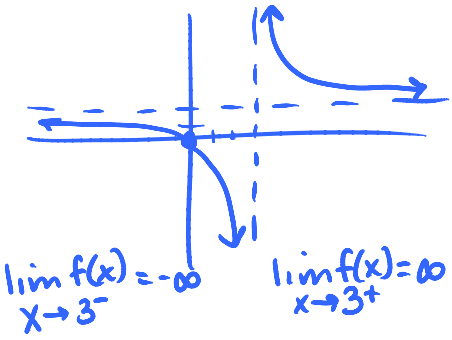
VA $x=3$ dom: $(-\infty,3)\cup(3,\infty)$

HA $y=2$ range: $(-\infty,2)\cup(2,\infty)$

$\lim_{x\to-\infty} f(x)=2$ $\lim_{x\to\infty} f(x)=2$

x-int: $0=\frac{2x}{x-3}$, $0=2x$, $x=0$

y-int: $y=0$



b) $y = \frac{x-2}{x^2+3x-10}$

$(x-2)(x+5)$

$y=\frac{1}{x+5}$

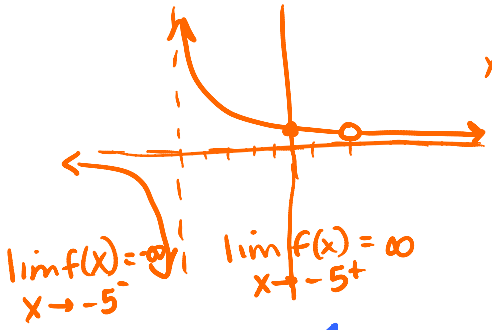
VA. $x=-5$

RD $(2,\frac{1}{7})$

HA $y=0$ $\lim_{x\to-\infty} f(x)=0$ $\lim_{x\to\infty} f(x)=0$

x-int: $0=\frac{1}{x+5}$ NONE

y-int: $y=\frac{1}{5}$ $(0,\frac{1}{5})$



c) $y = \frac{3x^2+4x-2}{x+1}$

VA: $x=-1$

HA: None

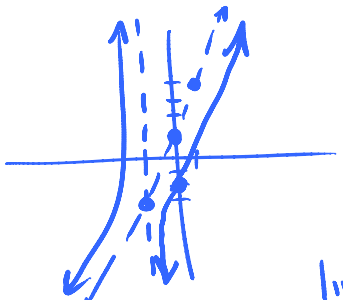
Slant A: $-1\,|\,3\ \ 4\ \ -2$, $+\ \ -3\ \ -1$, $3\ \ 1\ \ |\ -3$, $y=3x+1$

$\lim_{x\to-\infty} f(x)=3x+1$ $\lim_{x\to\infty} f(x)=3x+1$

x-int: $x=\frac{-4\pm\sqrt{16-4(3)(2)}}{2(3)}$, $x=\frac{-4\pm\sqrt{40}}{6}$

y-int: $y=-2$

$\lim_{x\to-1^-} f(x)=\infty$ $\lim_{x\to-1^+} f(x)=-\infty$



2) Write an equation for the polynomial function with degree 4 and having zeros at $3, -1,$ *and* $2-i$.

also $2+i$

Factored Form: $f(x)=(x-3)(x+1)(x-(2-i))(x-(2+i))$

(x^2-2x-3)

	x	-2	$+i$
x	x^2	$-2x$	xi
-2	$-2x$	4	$-2i$
$-i$	$-xi$	$2i$	1

(x^2-4x+5)

	x^2	$-2x$	-3
x^2	x^4	$-2x^3$	$-3x^2$
$-4x$	$-4x^3$	$8x^2$	$12x$
5	$5x^2$	$-10x$	-15

Standard Form: $f(x)=x^4-6x^3+10x^2-2x-15$

3) Solve $\frac{x}{x+1}+\frac{2}{x}=\frac{5}{x^2+x}$ using an algebraic method (LCD).

$x(x+1)$ LCD $x\neq 0,-1$

$x(x+1)\left[\frac{x}{x+1}+\frac{2}{x}=\frac{5}{x(x+1)}\right]$

$x^2+2(x+1)=5$

$x^2+2x+2=5$

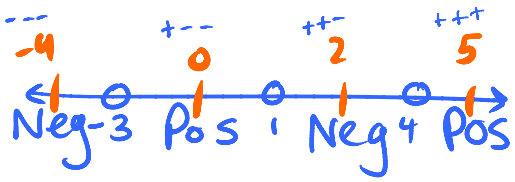
$x^2+2x-3=0$

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

$x=1,-3$

4) Solve $(x+3)(x-1)(x-4)<0$ using an algebraic method (sign chart).

zeros $x=-3,1,4$ Neg



$(-\infty,-3)\cup(1,4)$

CALC OK!

5) Find ALL the zeros for $y=x^4-2x^2+16x-15$.

from calc $x=-3,1$

-3	1	0	-2	16	-15
+		-3	9	-21	15
	1	-3	7	-5	0 ✓
1	1	-3	7	-5	
+		1	-2	5	
	1	-2	5	0 ✓	

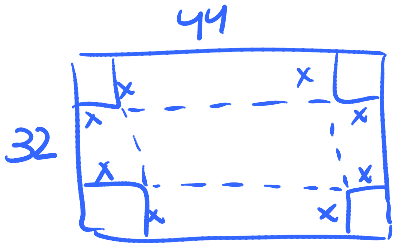
x^2-2x+5

$x^2-2x+5=0$

$x=\frac{2\pm\sqrt{4-4(1)(5)}}{2(1)}=\frac{2\pm\sqrt{-16}}{2}$

$x=\frac{2\pm 4i}{2}=1+2i$

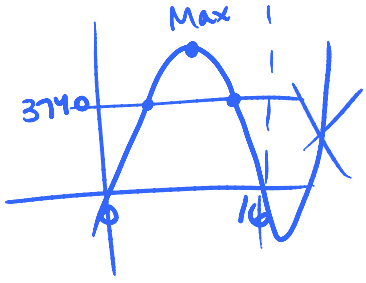
6) A pan is to be made by cutting out square corners of a 32" by 44" piece of sheet metal, folding up the sides, and welding the seams. What size squares should be cut out for the pan to have a maximum volume? … for the pan to have a volume of at least 3740 cubic inches?



$V=l\times w\times h$

$Y_1: V=(44-2x)(32-2x)x$

$Y_2=3740$ intersections: $x=5$ in, 7.3 in



Max = 3840.8 in^3

$x=6.1$ in cuts

$[5,7.3]$