Day 8 - Question #4;
Using a graphing calculator to solve a word problem involving a local extremum of a polynomial function

On a rectangular piece of cardboard with perimeter 14 inches, three parallel and equally spaced creases are made (see Figure 1). The cardboard is then folded along the creases to make a rectangular box with open ends (see Figure 2). Letting x represent the distance (in inches) between the creases, use the ALEKS graphing calculator to find the value of x that maximizes the volume enclosed by this box. Then give the maximum volume. Round your responses to two decimal places.

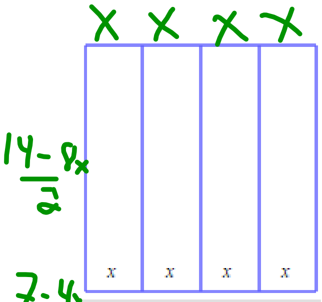


Figure 1

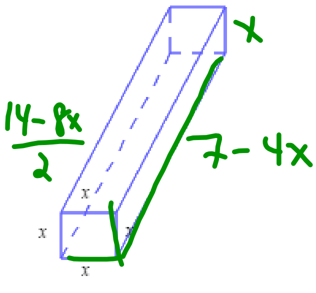
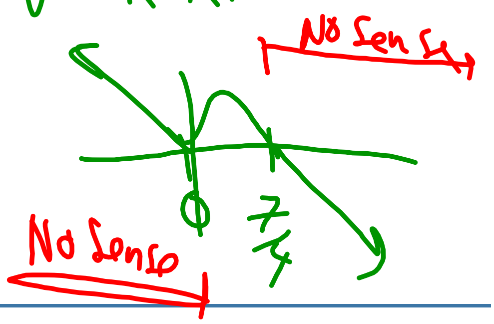


Figure 2

$V = x \cdot x(7-4x)$



Value of x that maximizes volume : in

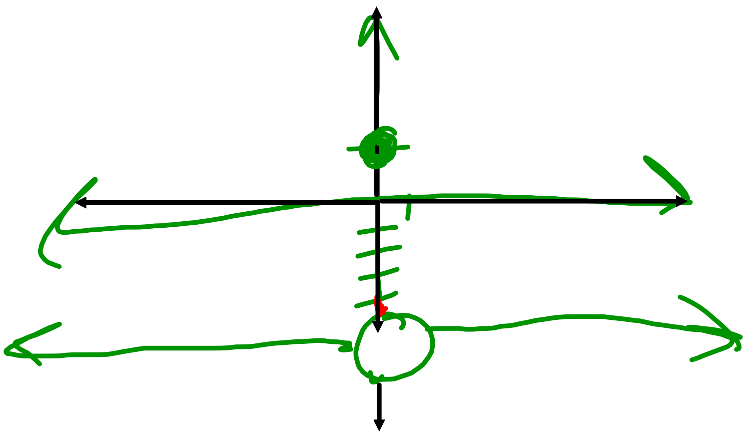
Graphing a piecewise-defined function: Problem type 1

Suppose that the function h is defined , for all real numbers, as follows.

$$h(x) = \begin{cases} -5 & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$$

Y=-5

Graph the function h.



Determining the end behavior of the graph of a polynomial function

Choose the end behavior of the graph of each polynomial function.

(a) $f(x) = 5x^3 - 3x^2 - 2x - 9$ odd +	✓ Falls to the left and rises to the right Rises to the left and falls to the right Rises to the left and rises to the right Falls to the left and falls to the right
(b) $f(x) = 3x^6 + 5x^4 - 8x^3 - x$ even +	Falls to the left and rises to the right Rises to the left and falls to the right ✓ Rises to the left and rises to the right Falls to the left and falls to the right
(c) $f(x) = -x^2(3x-5)^2$ even −	Falls to the left and rises to the right Rises to the left and falls to the right Rises to the left and rises to the right ✓ Falls to the left and falls to the right

Finding a polynomial of a given degree with given zeros: Complex zeros

Find a polynomial $f(x)$ of degree 3 with real coefficients and the following zeros.

$2, 2-i$

$2 \quad x-2 \quad (x-2)((x-2)-i)((x-2)+i) \quad i^2=-1$

$2-i \quad x-(2-i) \quad x^2-4x+4-i^2$

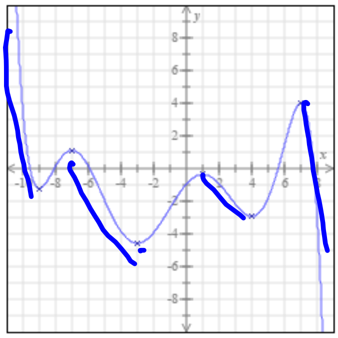
$2+i \quad x-(2+i) \quad x^2-4x+4-(-1)$

$(x^2-4x+5)(x-2) \Rightarrow$

$x^3-6x^2+13x-10$

$$\begin{array}{r} x^2-4x+5 \\ x-2 \\ \hline -2x^2+8x-10 \\ x^3-4x^2+5x \\ \hline x^3-6x^2+13x-10 \end{array}$$

Below is the graph of a polynomial function f with real coefficients. Use the graph to answer the following questions about f. All local extrema of f are shown in the graph.



2

(a) The function f is decreasing over which intervals? Choose all that apply.

☐ (-∞ , -9) ☐ (-7, -3) ☐ (-9, -3) ☐ (1, 4) ☐ (4, 7) ☐ (7, ∞)

(b) The function f has local minima at which x-values? If there is more than one value, separate them with commas.

-3 4 -9

(c) What is the sign of the leading coefficient of f?

Select One ▾

neg

Disco left

Faces 7

(d) Which of the following is a possibility for the degree of f? Choose all that apply.

☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

Consider the following polynomial functions. g(0)=0 diso right

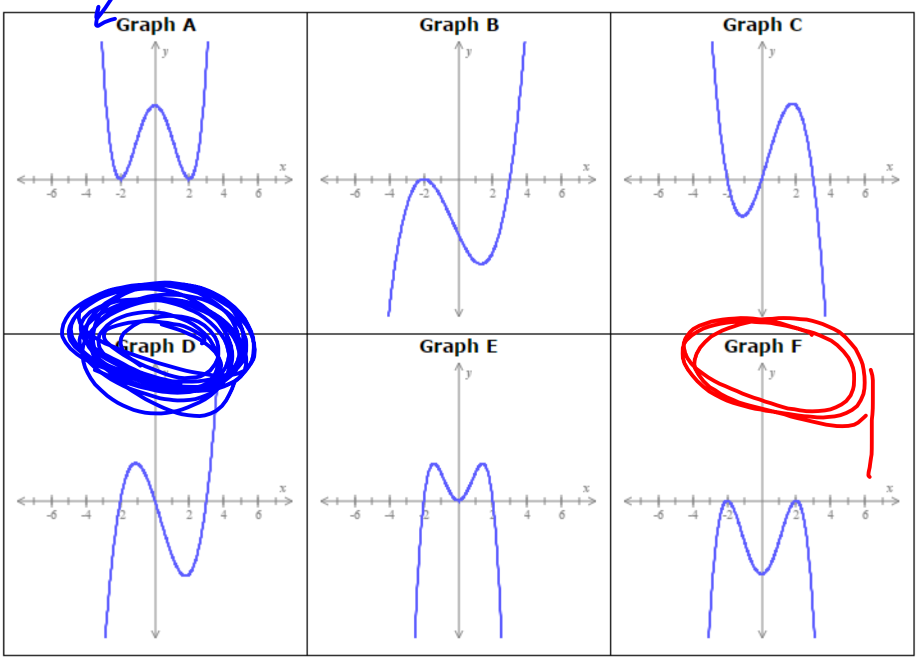
$f(x) = -(x-2)^2(x+2)^2$

$g(x) = 2x^3 - 2x^2 - 12x$

D=4 even

LC=sad

Choose the graph of each function from the choices below.

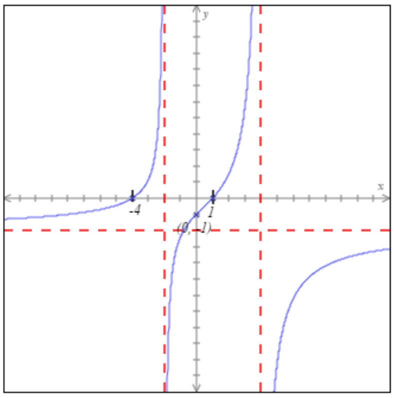


Writing the equation of a rational function given its graph

The figure below shows the graph of a rational function f with vertical asymptotes $x = -2$, $x = 4$, and horizontal asymptote $y = -2$. The graph also has x-intercepts of -4 and 1, and it passes through the point $(0, -1)$.

The equation for $f(x)$ has one of the five forms shown below. Choose the appropriate form for $f(x)$, and then write the equation. You can assume that $f(x)$ is in simplest form.

2 VA 2 zeros



- $f(x) = \dfrac{a}{x-b}$
- $f(x) = \dfrac{a(x-b)}{x-c}$
- $f(x) = \dfrac{a}{(x-b)(x-c)}$
- $f(x) = \dfrac{a(x-b)}{(x-c)(x-d)}$
- $f(x) = \dfrac{a(x-b)(x-c)}{(x-d)(x-e)}$

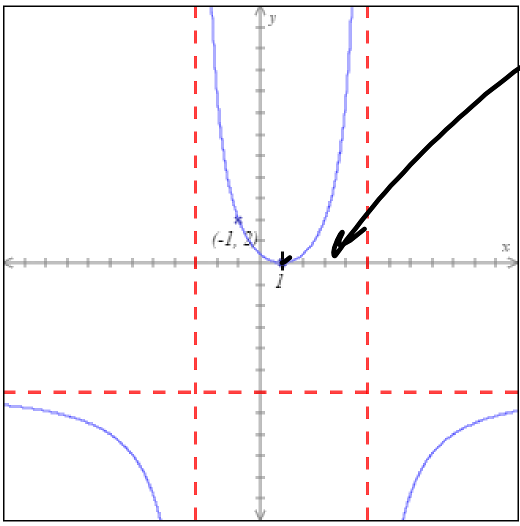
$$\frac{-2(x+4)(x-1)}{(x-4)(x+2)}$$

Writing the equation of a rational function given

The figure below shows the graph of a rational functior
$y = -6$. The graph also has an x-intercept of 1, and it

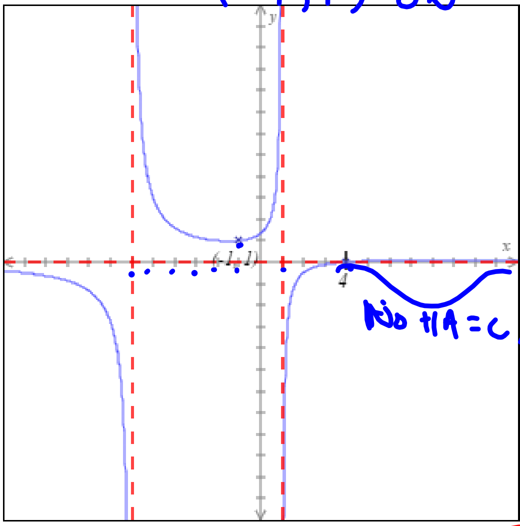
The equation for $f(x)$ has one of the five forms shown
You can assume that $f(x)$ is in simplest form.

Bounce



$$\frac{-6(x-1)(x-1)}{(x+3)(x-5)}$$

(-1,1) on Graph



No HA = c

- $f(x) = \dfrac{a}{x-b}$
- $f(x) = \dfrac{a(x-b)}{x-c}$
- $f(x) = \dfrac{a}{(x-b)(x-c)}$
- $f(x) = \dfrac{a(x-b)}{(x-c)(x-d)}$
- $f(x) = \dfrac{a(x-b)(x-c)}{(x-d)(x-e)}$

$$y = \frac{a(x-4)}{(x-1)(x+6)}$$

$$1 = \frac{a(-5)}{-2\cdot 5} \qquad a=2$$

$$y = \frac{2(x-4)}{(x-1)(x+6)}$$

Solving a rational inequality: Problem type 1

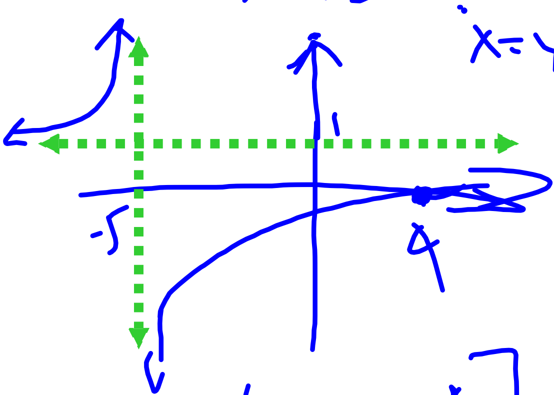
Solve the following inequality.

$$\frac{x-4}{x+5} \leq 0$$

Write your answer using interval notation.

$$y = \frac{x-4}{x+5} \leq 0 \quad x-4=0$$

$x=4$

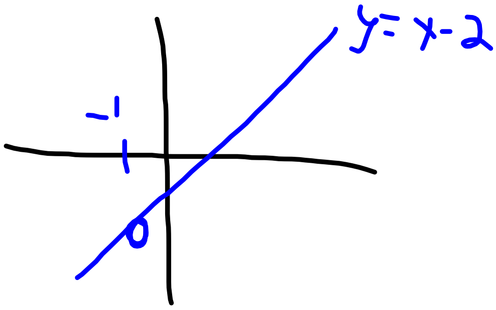


$(-5, 4]$

special

ZN=ZD ?

$$Y= \frac{(\cancel{X} + 1)(X-2)}{\cancel{X} + 1}$$

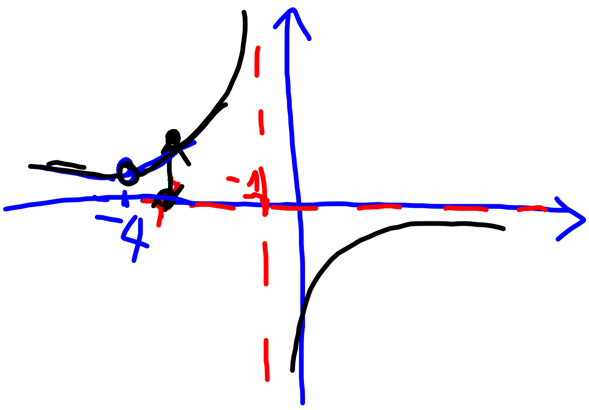


$$\frac{X+1}{X+1} = 1$$ No X=-1

Graphing rational functions with holes

Graph the rational function $h(x) = \dfrac{-3x-12}{x^2+5x+4}$. $= \dfrac{-3(\cancel{x+4})}{(\cancel{x+4})(x+1)}$

$$= \frac{-3}{x+1}$$



Day 8 - Question #5;
Finding zeros of a polynomial function written in factored

Find all real zeros of the function.

$$f(x) = -4(x+5)^3(x-4)^2$$

If there is more than one answer, separate them with commas.

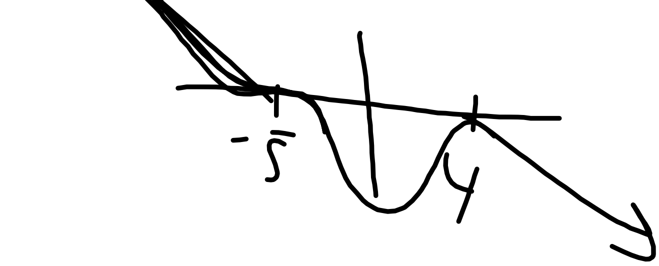
END Behav...

Degree 5 (odd)

Lead -4 (neg)

Disro Left

zeros: -5, 4

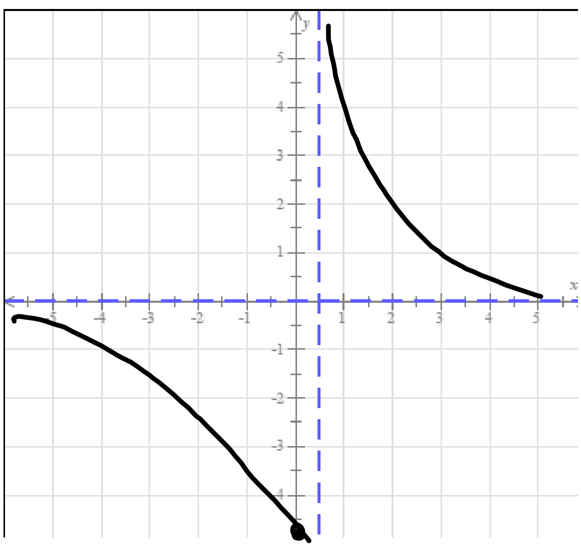


Day 8 - Question #9;
Finding the asymptotes of a rational function: Basic

Graph all vertical and horizontal asymptotes of the function.

$$f(x) = \frac{8}{(2x-1)},$$

$f(0) = \frac{8}{-1}$



Day 8 - Question #13;
Graphing a rational function: Quadratic over linear

Graph the rational function $f(x) = \dfrac{9x^2+12x+1}{3x+2}$.

To graph the function, draw the asymptotes (if any) and plot at least t
graph.

$$3x+2\,\overline{)\,9x^2+12x+1}\quad 3x+2$$
$$-(9x^2+6x)$$
$$6x+1$$
$$-(6x+4)$$

Zeros: $0 = 9x^2+12x+\cancel{4}\,1$

$$x = \frac{-12 \pm \sqrt{144-4(9)}}{2(9)}$$

$$\frac{-12 \pm \sqrt{108}}{18}$$