SECTION 2.6 **Rational Functions**

new language!

1) Find the domain of $f(x) = \dfrac{(4x)}{(x-2)}$ and discuss the behavior of f near the excluded values (using limits)

V.A. $x = 2$ HA $y = 4$ } Before seeing Graph

Domain: $(-\infty, 2) \cup (2, \infty)$

look at graph in G.C.

$\lim\limits_{x \to 2^-} f(x) = -\infty$

← As x approaches 2 from the left

$\lim\limits_{x \to 2^+} f(x) = \infty$

← As x approaches 2 from the right

2) Find the vertical and horizontal asymptotes of $f(x) = \dfrac{5x^2}{x^2-1}$

Domain $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$

$(x-1)(x+1) = 0$
$x = 1 \quad x = -1$

V.A. (eqn) set unique factors in D = 0

HA. (eqn) compare degree of N to degree of D   deg of N = deg of D
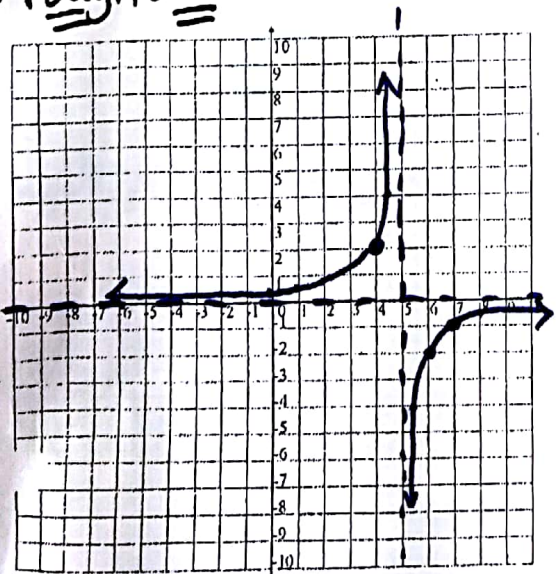
$y = 5$

Graph in calc - draw sketch
discuss limits around asymptotes

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

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

HA }
$\lim\limits_{x \to -\infty} f(x) = 5$
$\lim\limits_{x \to \infty} f(x) = 5$

3) Sketch the graph of $f(x) = \dfrac{2}{(5-x)}$ and state its domain.

PLOT POINTS
use TBL in calc
Graph paper
NO rough sketch!

DOMAIN:
$(-\infty, 5) \cup (5, \infty)$

x·int (set N = 0) DNE
y·int (let x = 0) $(0, \frac{2}{5})$

V.A. $x = 5$

H.A $y = 0$

$\lim\limits_{x \to 5^-} f(x) = \infty$
$\lim\limits_{x \to 5^+} f(x) = -\infty$

$\lim\limits_{x \to -\infty} f(x) = 0$
$\lim\limits_{x \to \infty} f(x) = 0$

Graph before discussing limits