$-10 \cdot 6 = -60$
$-10 + 6 = -4$

$4x^2 - 10x + 6x - 15$
$2x(2x-5) + 3(2x-5)$
$(2x+3)(2x-5)$

$-12 \cdot 3 = -36$
$-12 + 3 = -9$

$2x^2 - 12x + 3x - 18$
$2x(x-6) + 3(x-6)$
$(2x+3)(x-6)$

**A** **3**

Find the domain of
$$\frac{4x^2 - 4x - 15}{2x^2 - 9x - 18}$$

Skip x of hole + skip VA

D: $\boxed{(-\infty, -3/2) \cup (-3/2, 6) \cup (6, \infty)}$

$$\frac{\cancel{(2x+3)}(2x-5)}{\cancel{(2x+3)}(x-6)}$$

Hole at $(-3/2, 16/15)$

$$\frac{2(-3/2)-5}{-3/2-6} = \frac{16}{15}$$

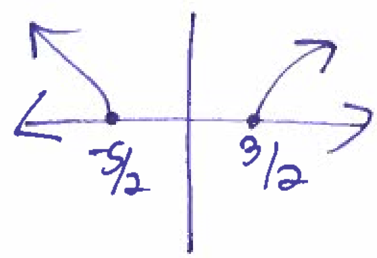
VA at $x = 6$

Go to $\boxed{O}$

☑ Fix → Answer on B

**B** $(-\infty, \cancel{-6}\ -5/2] \cup [3/2, \infty)$

Find the
$$\lim_{x \to -\infty}$$
for f(x) =
$$\sqrt{4x^2 + 4x - 15}$$

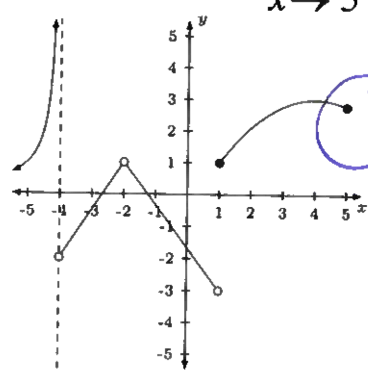



$\boxed{\infty}$

⇒ Go to T

**C** **[11, ∞)**

Find the $\lim_{x \to 5}$

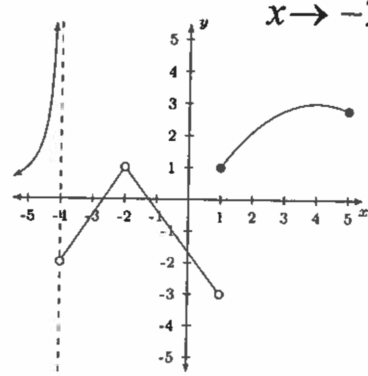



y-value is $\boxed{3}$ => Go to A

... it's ok that just one side goes to the dot

**D** **(-∞, ∞)**

Find the $\lim_{x \to -2}$




$\boxed{1}$ => Go to Q

y-value at hole

because both left side and right side of hole approach $y=1$

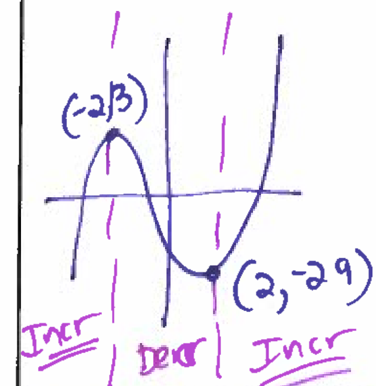
**E** -29 at x = 2

Find the increasing interval(s) for $f(x) = x^3 - 12x - 13$

Tell domain where y's increase from left to right

$\boxed{\text{Incr: } (-\infty, -2] \cup [2, \infty)}$

Go to M

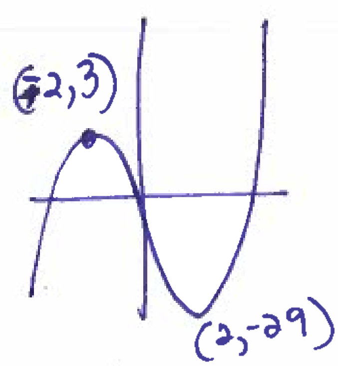



**F** [-2, 2]

Find the local maximum for $f(x) = x^3 - 12x - 13$

$\boxed{3 \text{ at } x = -2}$

Go to P



**G** $-\infty$

Find the range for $f(x) = \sqrt{4x^2 + 4x - 15}$

$(2x-3)(2x+5)$

x-int $(3/2, 0)$ and $(-5/2, 0)$

see factoring work on slide N


$\boxed{R: [0, \infty)}$

Go to S

**H** DNE

Find the $\lim_{x \to 6^-} f(x)$ for $f(x) = \dfrac{4x^2 - 4x - 15}{2x^2 - 9x - 18}$

$\dfrac{\cancel{(2x+3)}(2x-5)}{\cancel{(2x+3)}(x-6)}$

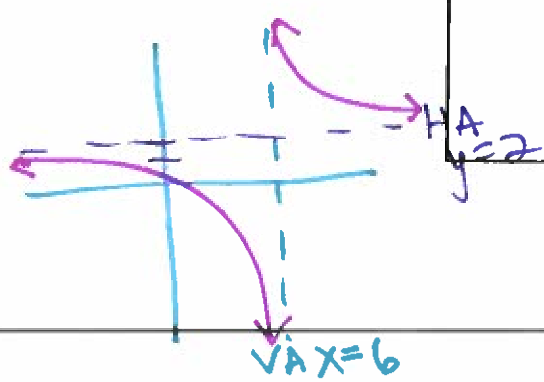
*see slide A for factoring work

Hole at $(-3/2, 16/15)$

VA $x=6$

$y = \dfrac{2(-3/2)-5}{-3/2-6} = \dfrac{16}{15}$

☑ Fix $\lim_{x \to 6^-}$




limit = y approaching from left side of x=6

$\boxed{-\infty}$ => Go to G

Fix Answer 16/15

**I** 16/15

Find the domain of f(x) + g(x)

$$f(x) = \sqrt{x-11}$$

$$g(x) = x^2 - 5$$

D: $\boxed{[11, \infty)}$ ⇒ Go to C

$f(x) + g(x)$

$= \sqrt{x-11} + x^2 - 5$


domain of $\sqrt{x-11}$

domain is $(-\infty, \infty)$ for parabola

overall domain

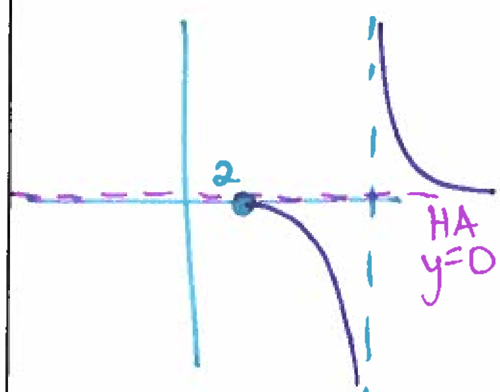
**J** [2, 11) U (11, ∞)

Find the range of

$$f(x) = \frac{\sqrt{x-2}}{x-11}$$

$\boxed{R: (-\infty, \infty)}$ ⇐ Go to D

Doesn't skip HA of $y = 0$ because has x-int of (-2, 0)




x=11 VA

$\frac{\text{Degree } 1/2}{\text{Degree } 1}$ → bottom degree bigger

HA: y=0

**K** **-3**

Find the
$$\lim_{x \to -\infty}$$
for $f(x) = \dfrac{4x^2 - 4x - 15}{2x^2 - 9x - 18}$

HA: $y = \frac{4}{2}$ ratio

because $\frac{\text{degree } 2}{\text{degree } 2}$ same degree

HA: $y = 2$

$\boxed{2}$ → Go to N

**L** **(-3, -1/9)**

Find the domain of
$$f(x) = \frac{\sqrt{x-2}}{\underbrace{x-11}_{\text{VA at } x=11}}$$

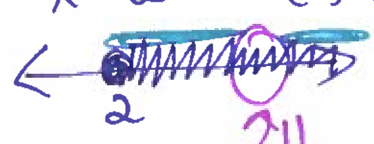
x-int
$0 = \frac{\sqrt{x-2}}{x-11}$

$0 = \sqrt{x-2}$

$0 = x-2$

$x = 2$

x-int $(2,0)$




Go to J ⇐ $\boxed{D: [2, 11) \cup (11, \infty)}$

☑ change equation on slide M

$y = \frac{\cancel{x+3}}{\cancel{(x+3)}(x-6)}$

Hole at $x=-3$

$\boxed{\left(-3, -\tfrac{1}{9}\right)}$

Go to L

$y = \frac{1}{-3-6} = \frac{-1}{9}$

**M** $(-\infty, -2]$
$\cup [2, \infty)$

Find the removable discontinuity for f(x) =

$$\frac{4x^2 - 4x - 15}{2x^2 - 9x - 18}$$

$f(x) = \frac{x+3}{x^2-3x-18}$

$\frac{(2x+3)(2x-5)}{(2x+3)(x-6)}$

Hole at $x = -3/2$

$\boxed{\left(-\tfrac{3}{2}, \tfrac{16}{15}\right)}$

$y = \frac{2(-3/2)-5}{-3/2-6} = \frac{16}{15}$

$10 \cdot -6 = -60$

$10 + -6 = 4$

$4x^2 + 10x - 6x - 15$

$2x(2x+5) - 3(2x+5)$

$(2x-3)(2x+5)$

$0 = \sqrt{(2x-3)(2x+5)}$

$0 = 2x-3 \quad 0 = 2x+5$

$x = 3/2 \quad x = -5/2$

x-int $(3/2, 0)$ + $(-5/2, 0)$

$-5/2 \quad 3/2$

**N** 2

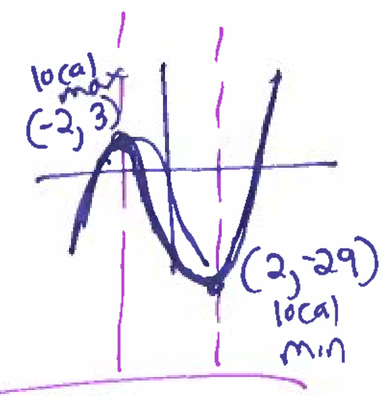
Find the domain of

$$f(x) = \sqrt{4x^2 + 4x - 15}$$

$\boxed{D: (-\infty, -5/2] \cup [3/2, \infty)}$ ⟹ Go to B

**O** (-∞, -3/2) U (-3/2, 6) U (6,∞)

Find the decreasing interval(s) for
$f(x) = x^3 - 12x - 13$

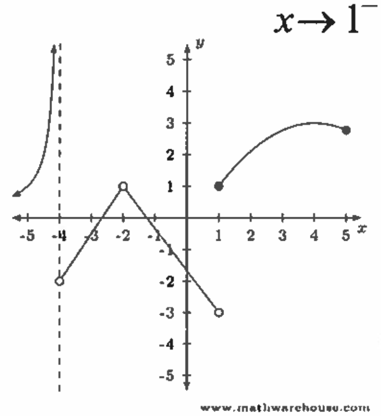



Go to F ← $\boxed{\text{Decr: } [-2, 2]}$

tell domain (x-values) when y's drop from left to right

**P** 3 at x = -2

**Find the** $\lim\limits_{x \to 1^-} =$




find y value approaching as x gets closer to x = 1 from left (-) side

$\boxed{-3}$ ← y-value of hole

Go to K

*see factoring work on slide A

$$\frac{(\cancel{2x+3})(2x-5)}{(\cancel{2x+3})(x-6)}$$

Hole at $(-3/2, 16/15)$

$$y = \frac{2(-3/2)-5}{-3/2-6} = \frac{16}{15}$$

## Q 1

Find the

$$\lim_{x\to -3/2} f(x)$$

x of hole

for f(x) =

$$\frac{4x^2 - 4x - 15}{2x^2 - 9x - 18}$$

Fix

$\lim_{x\to -3/2}$

limit is y of hole $= \boxed{\frac{16}{15}}$

Go to I

## R $(-\infty, 11)$

Find the

$$\lim_{x\to 6}$$

for f(x) =

$$\frac{4x^2 - 4x - 15}{2x^2 - 9x - 18}$$

$\boxed{\text{DNE}}$ ⇒ Go to H

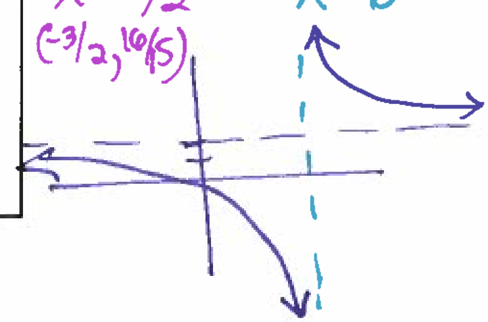
because limits from left hand side and right hand side don't agree

$$\frac{(\cancel{2x+3})(2x-5)}{(\cancel{2x+3})(x-6)}$$

*see slide A for factoring work

Hole at $x = -3/2$ $(-3/2, 16/15)$

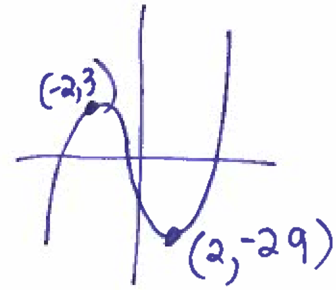
VA at $x = 6$



x=6

**S** [0, ∞)

Find the local minimum for $f(x) = x^3 - 12x - 13$




local min is
$\boxed{-29 \text{ at } x=2}$ ⇒ Go to E

**T** ∞

Find the domain of $g(f(x))$

$$f(x) = \sqrt{11 - x}$$

$$g(x) = \frac{x^2 - 5}{x^2}$$

$\boxed{D: (-\infty, 11)}$ → Go to R

$g(f(x))$
$= g(\sqrt{11-x})$
$= \dfrac{(\sqrt{11-x})^2 - 5}{(\sqrt{11-x})^2}$
$= \dfrac{11-x-5}{11-x} = \dfrac{6-x}{11-x}$

VA x=11

f(x) domain


Need domain for overall g(f(x)) intersected with inner f(x) domain

A, O, F, P, K, N, B, T, R, H, G, S,
E, M, L, J, D, Q, I, C, A