ANS review #26

January-09-13
8:34 AM

Review Finding Domain & Range

1. Summarize the method of finding the domain.

- look for denominators + radicals + logs that have restrictions on domain
- solve
  - radicand ≥ 0
  - log input > 0
  - denominator $\neq 0$

2. Summarize the method of finding the range overall

sketch to see absolute MAX + MIN y values get

3. Find domain algebraically, then sketch and find range graphically

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

radicand ≥ 0

$2x - 5 \geq 0$

$2x \geq 5$

$x \geq \frac{5}{2}$

$\therefore D = \{x \in \mathbb{R}, x \geq 5/2\}$

or $x \in [5/2, \infty)$

sketch:

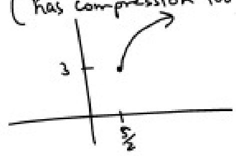
$\sqrt{2(x - 5/2)} + 3$

parent $y = \sqrt{x}$

shift right $5/2$

up 3

(no reflections
has compression too)



$\therefore R = \{y \in \mathbb{R}, y \geq 3\}$

or $y \in [3, \infty)$

$b(x) = 3\log_5(14 - 7x) - 4$

log input > 0

$14 - 7x > 0$

$-7x > -14$

$x < 2$

$\therefore D = \{x \in \mathbb{R}, x < 2\}$

or $x \in (-\infty, 2)$

sketch

$3\log_5(-7(x-2)) - 4$

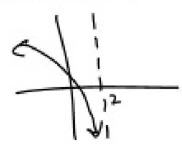
parent $y = \log_5 x$

shift right 2

down 4

reflected in y-axis

(with stretch/compress
but will not show these)



$\therefore R = \{y \in \mathbb{R}\}$

or $y \in (-\infty, \infty)$

$c(x) = \dfrac{x - 11}{2x^2 - 15x - 8}$

denom $\neq 0$

$2x^2 - 15x - 8 \neq 0$

$(2x + 1)(x - 8) \neq 0$

$\therefore D = \{x \in \mathbb{R}, x \neq -\frac{1}{2}, 8\}$

or $x \in (-\infty, -\frac{1}{2}), (-\frac{1}{2}, 8), (8, \infty)$

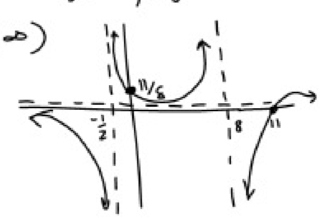
sketch:

VA $x = -\frac{1}{2}, 8$

HA $y = 0$

zero $x = 11$

y-int $y = 11/8$



$\therefore R = \{y \in \mathbb{R}\}$

or $y \in (-\infty, \infty)$

$d(x) = 2x^2 - 8x - 10$

no restrictions

$\therefore D = \{x \in \mathbb{R}\}$

or $x \in (-\infty, \infty)$

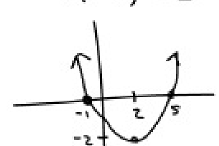
sketch:

$2(x^2 - 4x \quad) - 10$

$2(x^2 - 4x + 4 - 4) - 10$

$2(x-2)^2 - 4(2) - 10$

$2(x-2)^2 - 2$



$\therefore R = \{y \in \mathbb{R}, y \geq -2\}$

or $y \in [-2, \infty)$

Find domain algebraically, then sketch and find range graphically

$e(x) = -2(3.5)^x - 6$

exponential, no restrictions

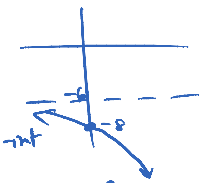
$D = \{x \in \mathbb{R}\}$

sketch:

parent $y = 3.5^x$ growth

$a = -2$ reflected + distance HA to y-int

$c = -6$ HA.



$\therefore R = \{y \in \mathbb{R}, y < -6\}$

$f(x) = 4 - \sqrt{5 - 10x}$

radicand ≥ 0

$5 - 10x \geq 0$

$-10x \geq -5$

$x \leq 0.5$

$\therefore D = \{x \in \mathbb{R}, x \leq 0.5\}$

or $x \in (-\infty, 0.5]$

sketch

parent $y = \sqrt{x}$

$-\sqrt{-10(x-0.5)} + 4$

reflected twice

compressed

right + up

$\therefore R = \{y \in \mathbb{R}, y \leq 4\}$

or $y \in (-\infty, 4]$

$g(x) = -2|x + 5|$

abs.val, no restrictions

$D = \{x \in \mathbb{R}\}$

sketch:

parent $y = |x|$

reflected

stretched

left

$\therefore R = \{y \in \mathbb{R}, y \leq 0\}$

or $y \in (-\infty, 0]$

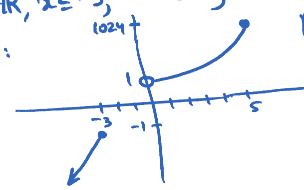
$h(x) = \begin{cases} x+2, x \leq -3 \\ 4^x, 0 < x \leq 5 \end{cases}$

piecewise

domain is

$D = \{x \in \mathbb{R}, x \leq -3, 0 < x \leq 5\}$

sketch:



$R = y \in (-\infty, -1]$

$(1, 1024]$

$i(x) = 4\log_{0.5}(2x - 1)$

log input > 0

$2x - 1 > 0$

$2x > 1$

$x > \frac{1}{2}$

$\therefore D = x \in (\frac{1}{2}, \infty)$

sketch:

parent $y = \log_{0.5} x$ decay

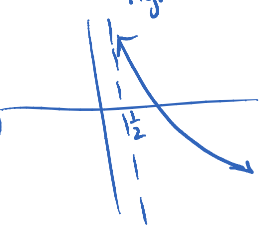
$y = 4\log_{0.5}(2(x - \frac{1}{2}))$

stretched + compressed

no reflection

right

$\therefore R = y \in (-\infty, \infty)$



$j(x) = \dfrac{3x^2}{2x^3 + 3x^2 - 18x + 8}$

denom $\neq 0$

$f = 2x^3 + 3x^2 - 18x + 8 \neq 0$

$\pm \frac{p}{q} = \pm \frac{8}{2}, \frac{8}{1}, \frac{4}{2}, \frac{4}{1}, \frac{2}{2}, \frac{2}{1}, \frac{1}{2}, \frac{1}{1}$

$f(2) = 0$ $\therefore (x - 2)$ is a factor

2	2	3	-18	8
	↓	4	14	-8
	2	7	-4	0

$(x-2)(2x^2 + 7x - 4) \neq 0$

$(x-2)(2x-1)(x+4) \neq 0$

$D = \{x \in \mathbb{R}, x \neq 2, \frac{1}{2}, -4\}$

sketch:

$\dfrac{3x^2}{(x-2)(2x-1)(x+4)}$

VA $x = 2, \frac{1}{2}, -4$

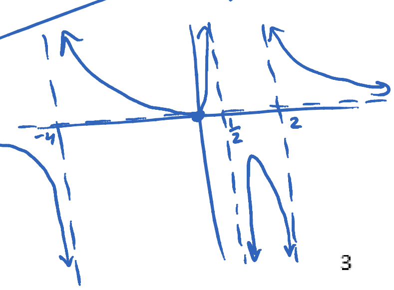
HA $y = 0$

zero $x = 0$

y-int $y = 0$

HA gets crossed

$\therefore R = \{y \in \mathbb{R}\}$



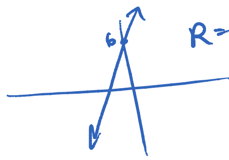
Find domain algebraically, then sketch and find range graphically

$k(x)=\frac{2}{5}x+6$

linear, no restrictions

$D=\{x\in\mathbb{R}\}$

sketch:
$m=2/5$
$b=6$



$R=\{y\in\mathbb{R}\}$

$l(x)=\sqrt[3]{2x+6}-8$

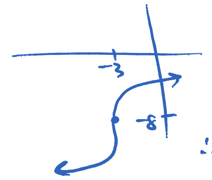
cube root, no restrictions

$D=\{x\in\mathbb{R}\}$

sketch:
parent $y=\sqrt[3]{x}$

$y=\sqrt[3]{2(x+3)}-8$

compressed
left
down



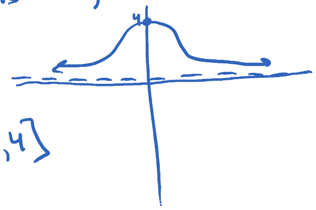
$\therefore R=\{y\in\mathbb{R}\}$

$m(x)=\frac{\cancel{x}4}{x^2+1}$

denom $\neq 0$
$x^2+1\neq 0$
can't factor
$\therefore$ no restrictions

$D=\{x\in\mathbb{R}\}$

sketch:
no VA
HA $y=0$
zero none
y-int $y=4$



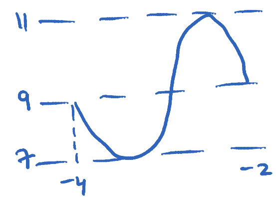
$R=y\in(0,4]$

$n(x)=-2\sin(\pi(x+4))+9$

sinusoidal, no restrictions

$D=\{x\in\mathbb{R}\}$

sketch:
$a=-2$
$c=9$
period $=\frac{2\pi}{\pi}=2$
$d=-4$

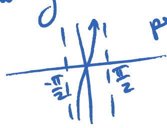


$\therefore R=y\in[7,11]$

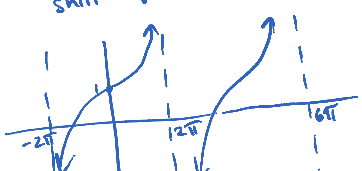
$o(x)=\tan 4x+1$

has VA's !

parent $y=\tan x$ period $=\pi$



horiz. stretch
$\therefore$ new period $=4\pi$
shift up 1



$D=\{x\in\mathbb{R},\ x\neq -2\pi, 2\pi, 6\pi, \ldots\}$

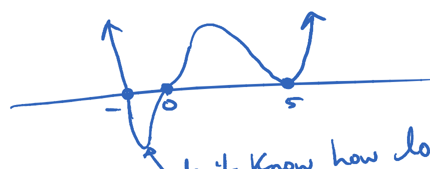
$R=\{y\in\mathbb{R}\}$

$p(x)=x^3(x-5)^2(x+1)$

degree 6 polynomial, no restrictions

$D=\{x\in\mathbb{R}\}$

sketch: bend at $x=0$
bounce at $x=5$
cut at $x=-1$



don't know how low this is
can find t.p. using i.r.o.c.
or derivatives from calculus.

$\therefore R=\{y\in\mathbb{R},\ y\geq \text{Abs. Min}\}$