Exam 1 Review: Chat what questions you want to see.

Note: No recitation Tuesday

~~3~~, ~~6~~, ~~9~~, ~~10~~, ~~11~~, ~~12~~, ~~8~~, ~~4~~, ~~15~~

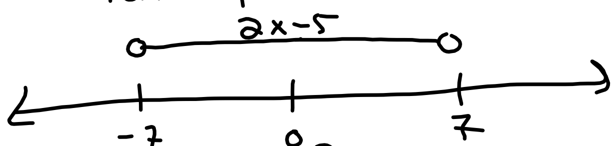
~~5~~, ~~14~~ ~~7~~

1. Solve $|2x-5|+5 < 12$

Isolate ab value.

$$|2x-5| + 5 < 12$$
$$\quad -5 \quad -5$$

$$|2x-5| < 7$$



AND

$$-7 < 2x - \cancel{5} < 7$$
$$+5 \qquad \cancel{+5} \quad +5$$

$$\frac{-2}{2} < \frac{2x}{2} < \frac{12}{2}$$

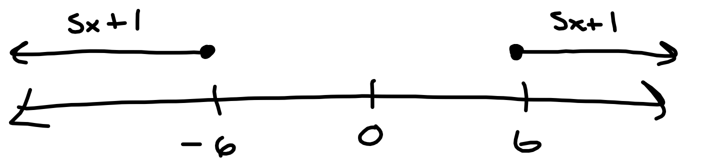
$$-1 < x < 6$$

$$\boxed{(-1, 6)}$$

② $|5x+1| - 2 \geq 4$
$\quad\quad\quad\;\; +2 \quad +2$

Isolate abs. value first

$|5x+1| \geq 6$



OR

$5x+1 \leq -6$
$\;\;\; -1 \quad\; -1$

$\frac{5x}{5} \leq \frac{-7}{5}$

$x \leq -7/5$

$5x+1 \geq 6$
$\;\;\; -1 \quad -1$

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

$x \geq 1$

OR

$\boxed{(-\infty, -\frac{7}{5}] \cup [1, \infty)}$

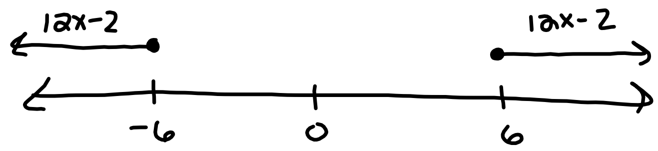
3. Find domain of

$f(x) = 32\sqrt{|12x-2|-6}$

cant take $\sqrt{\ }$ of negative!

$|12x-2| - 6 \geq 0$
$\quad\quad +6 \quad +6$

$|12x-2| \geq 6$



$12x-2 \leq -6$ OR $12x-2 \geq 6$

$+2 \quad +2 \qquad\qquad +2 \quad +2$

$\frac{12x}{12} \leq \frac{-4}{12} \qquad \frac{12x}{12} \geq \frac{8}{12}$

$x \leq -4/12 \qquad x \geq 8/12$

$x \leq -1/3$ OR $x \geq 2/3$

$\boxed{(-\infty, -1/3] \cup [2/3, \infty)}$

4. Find domain of $g(x) = \frac{2}{\sqrt{x}} - \frac{2x+1}{x^2-9}$

can't have den $= 0$

$\neq 0$

$\sqrt{x}$ needs to be > 0

$x > 0$

$x^2 - 9 \neq 0$

$(x-3)(x+3) \neq 0$

$(x-3) \neq 0$ $(x+3) \neq 0$

$x \neq 3$ $\cancel{x \neq -3}$

since $x > 0$ we don't need to worry about this

$$\boxed{D = \{x \mid x > 0 \text{ and } x \neq 3\}}$$

$$\boxed{\text{Domain: } (0,3) \cup (3,\infty)}$$

5. Find the domain of $h(t) = \frac{t^2}{(t^4-16)}$

$\neq 0$

$t^4 - 16 \neq 0$

Method 1 Factor it

$(t^2-4)(t^2+4) \neq 0$

$(t+2)(t-2)(t^2+4) \neq 0$

$(t+2) \neq 0$ $\quad t-2 \neq 0$ $\quad \cancel{t^2+4 \neq 0}$

$\quad \cancel{-4 \quad -4}$

$t \neq -2$ $\quad t \neq 2$ $\quad \cancel{t^2 \neq -4}$

Never!

$t \neq \pm 2$

$$\boxed{\begin{gathered}\{t \mid t \neq \pm 2\} \\ (-\infty, -2) \cup (-2, 2) \cup (2, \infty)\end{gathered}}$$

Method 2

$t^4 - 16 \neq 0$

$\quad +16 \quad +16$

$\sqrt[4]{t^4} \neq \pm\sqrt[4]{16}$

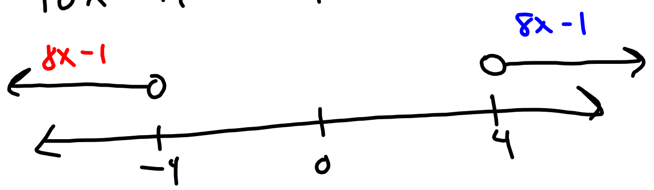
$t \neq \pm\sqrt[4]{16}$

$t \neq \pm 2$

6) Find domain of $f(x)=\dfrac{2x+2}{\underbrace{\sqrt{|8x-1|-4}}_{\neq 0}}$

$$|8x-1|\underset{+4}{-4} > \underset{+4}{0}$$

$$|8x-1| > 4$$



$$8x-1 < -4$$
$$\quad +1 \quad +1$$
$$\frac{8x}{8} < \frac{-3}{8}$$
$$x < -3/8$$

OK

$$8x-1 > 4$$
$$\quad +1 \quad +1$$
$$\frac{8x}{8} > \frac{5}{8}$$
$$x > 5/8$$

$$\boxed{(-\infty, -3/8) \cup (5/8, \infty)}$$

7\. Solve for x:

$3|5x-1| = 8$

Isolate abs. value

$\frac{\cancel{3}|5x-1|}{\cancel{3}} = \frac{8}{3}$

$\underbrace{|5x-1|}_{= \frac{8}{3} \text{ or } -\frac{8}{3}} = 8/3$

$\frac{-8}{3} + \frac{3}{3} = \frac{-5}{3}$

$5x - 1 = -8/3$ or $5x - 1 = 8/3$

$+1 \quad +1$; $+1 \quad +1$

$\frac{1}{5} \cdot 5x = -5/3 \cdot \frac{1}{5}$ or $\frac{5x}{5} = \frac{11}{3} \cdot \frac{1}{5}$

$x = -\frac{\cancel{5}}{3} \cdot \frac{1}{\cancel{5}}$; $x = \frac{11}{3} \cdot \frac{1}{5}$

$x = -\frac{1}{3}$; $x = \frac{11}{15}$

$\boxed{x = -\frac{1}{3}, \frac{11}{15}}$

8. f(x) Domain: $[-3,2)$

Range: $[0,4]$

Find D+R of $g(x) = -3f(5x+2)+10$

3 2 1 4

OR 1 4 3 2

1. Horizontal shift left 2 units
(x values → Domain)

D: $[-3,2) \rightarrow [-5,0)$

2. Horizontal compression by 1/5
(x values mult by 1/5)

D: $[-5,0) \rightarrow [-1,0)$

3. V. Stretch by 3 and flip over x axis.
(y values → Range)

R $[0,4] \xrightarrow{\text{st by 3}} [0,12] \xrightarrow{\text{Flip}} [0,-12]$

or $[-12,0]$

4. V. shift up 10
(y values → Range)

R: $[0,-12] \rightarrow [10,-2] = [-2,10]$ write in chron. order

careful!

$\boxed{\text{Domain}: [-1,0) \quad \text{Range}: [-2,10]}$

9.) Suppose $f(x)$ = $[\pi, \pi^2]$ Domain

Range: $(-2, -1)$

Find D+R of $g(x) = -8f(-5x+2) - 1$

③ ② ① ④

① Horizontal shift left 2
(x values domain)

$D: [\pi, \pi^2] \longrightarrow [\pi - 2, \pi^2 - 2]$

② H. comp by 1/5 . H flip over y-axis. (mult by -1)
(x values domain)

$D: [\pi - 2, \pi^2 - 2] \xrightarrow{\text{mult by } 1/5} [\frac{1}{5}(\pi-2), \frac{1}{5}(\pi^2-2)]$

mult by(-1) $[-\frac{1}{5}(\pi-2), -\frac{1}{5}(\pi^2-2)]$

flip for order $[-\frac{1}{5}(\pi^2-2), -\frac{1}{5}(\pi-2)]$

or $[\frac{-(\pi^2-2)}{5}, \frac{-(\pi-2)}{5}]$

③ V. Stretch by 8 and V. flip over x axis
(y values range)

$R: (-2, -1) \longrightarrow (-16, -8) \xrightarrow{\text{flip}} (-1(-16), -1(-8))$

$= (16, 8)$

flip order $= (8, 16)$

④ V. shift down 1
(y values range)

$(8, 16) \longrightarrow (7, 15)$

$$\boxed{\begin{array}{l}\text{Domain: } [-\frac{1}{5}(\pi^2-2), -\frac{1}{5}(\pi-2)] \\ \text{Range: } (7, 15)\end{array}}$$

(10) Which transformations in order take you from

$$g(x) \rightarrow h(x) = \underset{②}{\overset{①}{-3}}\, g(\underset{①}{\overset{③}{2}}x) \underset{③}{\overset{②}{-5}}$$

① Horizontal compression by 1/2

② V. stretch by 3. and V. flip over the x axis. (reflection)

③ V. shift down 5 units.

Horizontal
Shift
then
comp/stretch/flip

Vert.
comp/str/flip
then
shift.

$$\underset{③}{a}\, g(\underset{②}{b}x \underset{①}{\pm c}) \underset{④}{\pm d}$$

OR ① ④ ③ ②

11. Give eq of line passing through

$(-1, 4/3)$ and $(2, 8)$
$\;\;x_1 \;\; y_1 \qquad\quad x_2 \;\; y_2$

Slope: $\dfrac{y_2 - y_1}{x_2 - x_1}$

Slope: $\dfrac{8 - 4/3}{2 - (-1)} = \dfrac{24/3 - 4/3}{2 + 1} = \dfrac{20/3}{3}$

$\dfrac{\frac{20}{3}}{3} = \dfrac{20}{3} \cdot \dfrac{1}{3} = \dfrac{20}{9}$

Recall: $y - y_1 = m(x - x_1)$

$$\boxed{\begin{aligned} y - 4/3 &= \tfrac{20}{9}(x + 1) \\ &\text{OR} \\ y - 8 &= \tfrac{20}{9}(x - 2) \end{aligned}}$$

$$\boxed{y = \tfrac{20}{9}x + \tfrac{32}{9}.}$$

12. Give eq of line through

$(\sqrt{2}, 12)$ and $(\pi, 1)$

$x_1 \quad y_1 \qquad x_2 \quad y_2$

slope: $\dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{1-12}{\pi - \sqrt{2}} = \dfrac{-11}{\pi - \sqrt{2}}$

$y - y_1 = m(x - x_1)$

$$\boxed{\begin{array}{c} y - 12 = \dfrac{-11}{\pi - \sqrt{2}}(x - \sqrt{2}) \\ \text{or} \\ y - 1 = \dfrac{-11}{\pi - \sqrt{2}}(x - \pi) \end{array}}$$

(13) Give an eq of a line going through (2, 5) parallel to $3x+5y=2$

Get slope of parallel line

$$3x+5y=2$$
$$-3x \qquad -3x$$
$$\frac{5y}{5}=\frac{-3x+2}{5}$$
$$y=\frac{-3}{5}x+\frac{2}{5}$$

slope

Since our line is parallel our slope $=\frac{-3}{5}$ as well

slope: $-3/5$ point $(2,5)$

$$y-y_1=m(x-x_1)$$
$$\boxed{y-5=\frac{-3}{5}(x-2)}$$
$$y-5=\frac{-3}{5}x+\frac{6}{5}$$
$$+5 \qquad +5$$
$$y=\frac{-3}{5}x+\frac{6}{5}+\frac{25}{5}$$

$=5$

$$\boxed{y=\frac{-3}{5}x+\frac{31}{5}.}$$
$$f(x)=\frac{-3}{5}x+31/5$$

14. eq. of line through (8, 18) perpendicular to $\underbrace{y+8 = -12(x+3)}_{\text{point slope}}$

slope

our line is perpendicular to a line with a slope of -12

our slope: $\frac{1}{12}$

our line goes through $(\underset{x_1}{8}, \underset{y_1}{18})$

point slope form

$y - y_1 = m(x - x_1)$

$\boxed{y - 18 = \frac{1}{12}(x - 8)}$

$y - 18 = \frac{1}{12}x - \frac{8}{12}$

$y - 18 = \frac{1}{12}x - \frac{2}{3} + 18$

$+18$

$y = \frac{1}{12}x - \frac{2}{3} + \frac{54}{3}$

$\boxed{y = \frac{1}{12}x + \frac{52}{3}}$

15. Day 1: Tony ran 1.5 miles

after day 1 he ran .25 extra miles each day.

Find R(d) for d^{th} day.

Note: Day 2: $1.5 + .25 = 1.75$

$(1, 1.5)$ $(2, 1.75)$

x_1 y_1 x_2 y_2

Slope: $\frac{1.75 - 1.5}{2 - 1} = \frac{.25}{1} = .25$

Method 1

$y = mx + b$

$y = .25x + b$

$1.5 = .25(1) + b$

then solve for b

$1.5 = .25 + b$

$-.25 \quad -.25$

$1.25 = b$

$y = .25x + 1.25$

$\boxed{R(d) = .25d + 1.25}$

Method 2

start w/ point slope then isolate y

$y - y_1 = m(x - x_1)$

$y - 1.5 = .25(x - 1)$

$y - 1.5 = .25x - .25$

$+1.5 \qquad +1.5$

$y = .25x + 1.25$

$\boxed{R(d) = .25d + 1.25}$

$y = mx + b$ y int $(0, b)$