	A	B	C	D
=				
1	a	2		

A1 *a*

$y=2\csc(2x+\frac{3\cdot\pi}{4})+0$

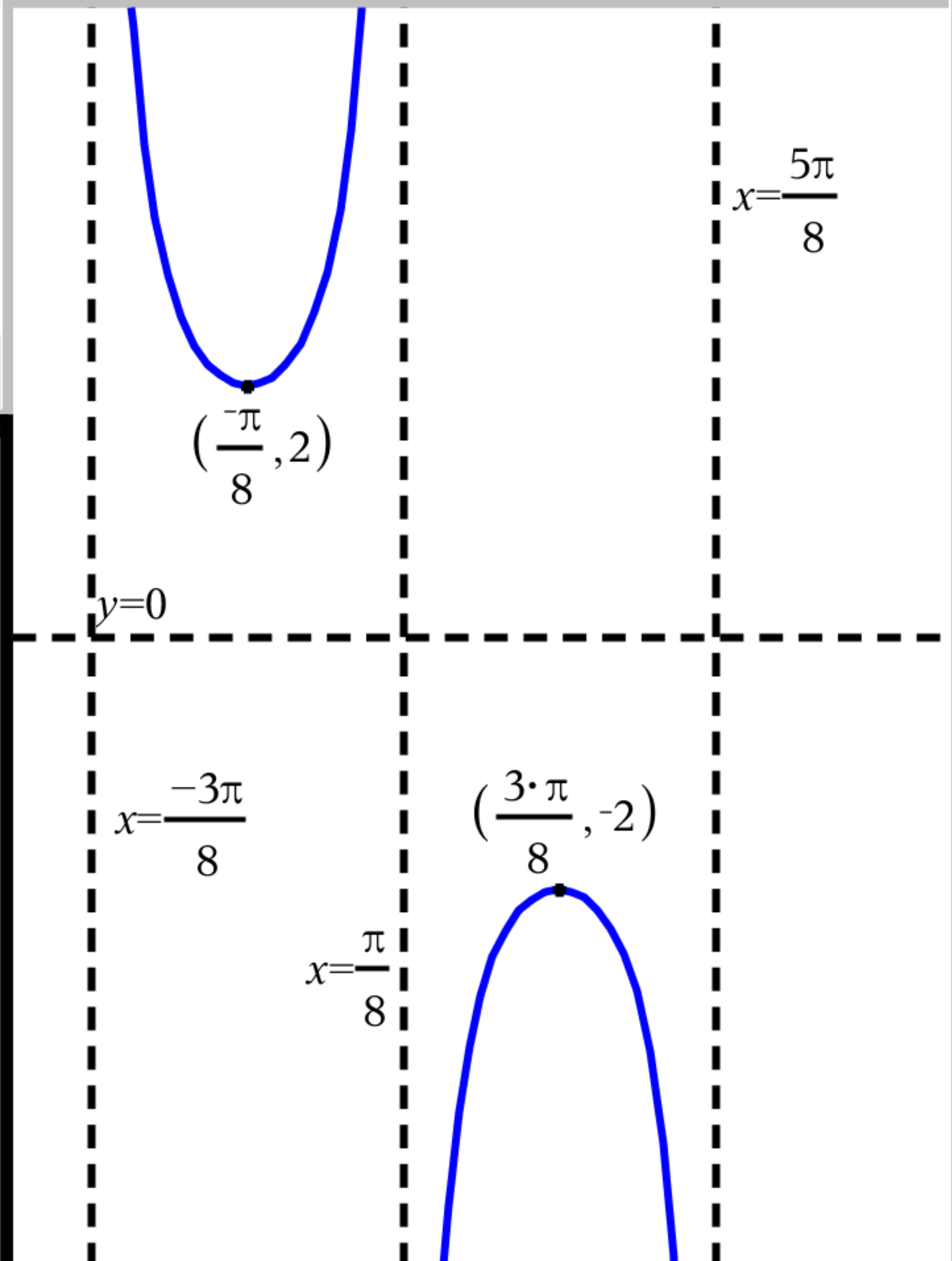
$y=2\csc(2(x+\frac{3\cdot\pi}{8}))+$

Period $(\frac{-3\cdot\pi}{8},\frac{5\cdot\pi}{8})$

Amplitude 2   Equation of Midline $y=0$

Equation of Asymptotes $x=\frac{-3\cdot\pi}{8}$ $x=\frac{\pi}{8}$ $x=\frac{5\cdot\pi}{8}$

Equation of All Asymptotes $x=\frac{-3\cdot\pi}{8}+\frac{n\cdot\pi}{2}$ with $n\in\mathbb{Z}$



Shift to left because start $= \frac{-3\cdot\pi}{8}$

We know $y=a\csc(b(x + \frac{3\cdot\pi}{8})) + d$

Period of this function $(\frac{-3\cdot\pi}{8}, \frac{5\cdot\pi}{8})$

This gives us a period length of $\frac{5\cdot\pi}{8} - \frac{-3\cdot\pi}{8} = \pi$

$|b| = 2\cdot\pi \div \pi = 2\cdot\pi \cdot \frac{1}{\pi} = 2$

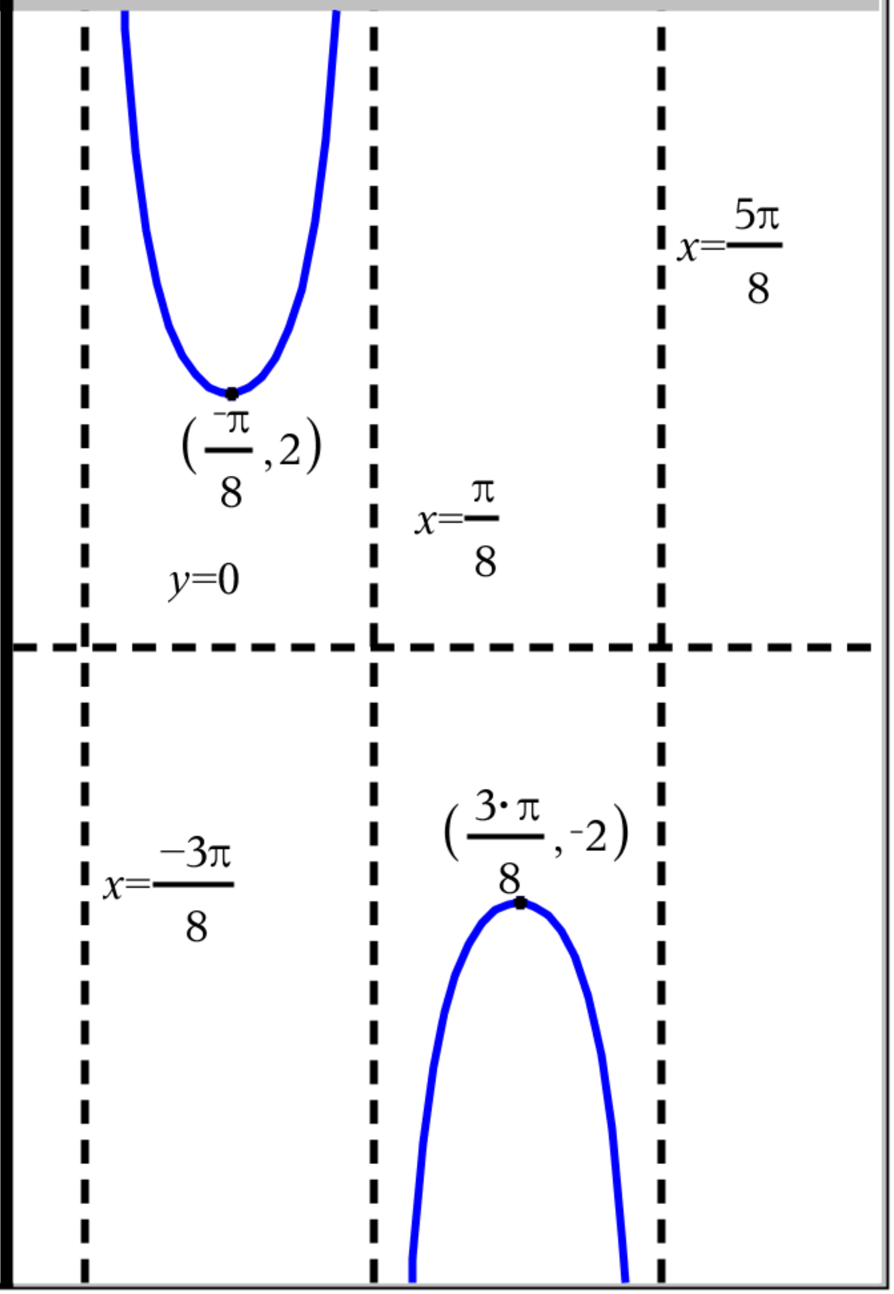
Since this IS NOT a reflection,

both a and b are positive

This means $y=a\csc(2(x + \frac{3\cdot\pi}{8})) + d$

Since the midline is $y=0$, this means

$y=a\csc(2(x + \frac{3\cdot\pi}{8})) + 0$



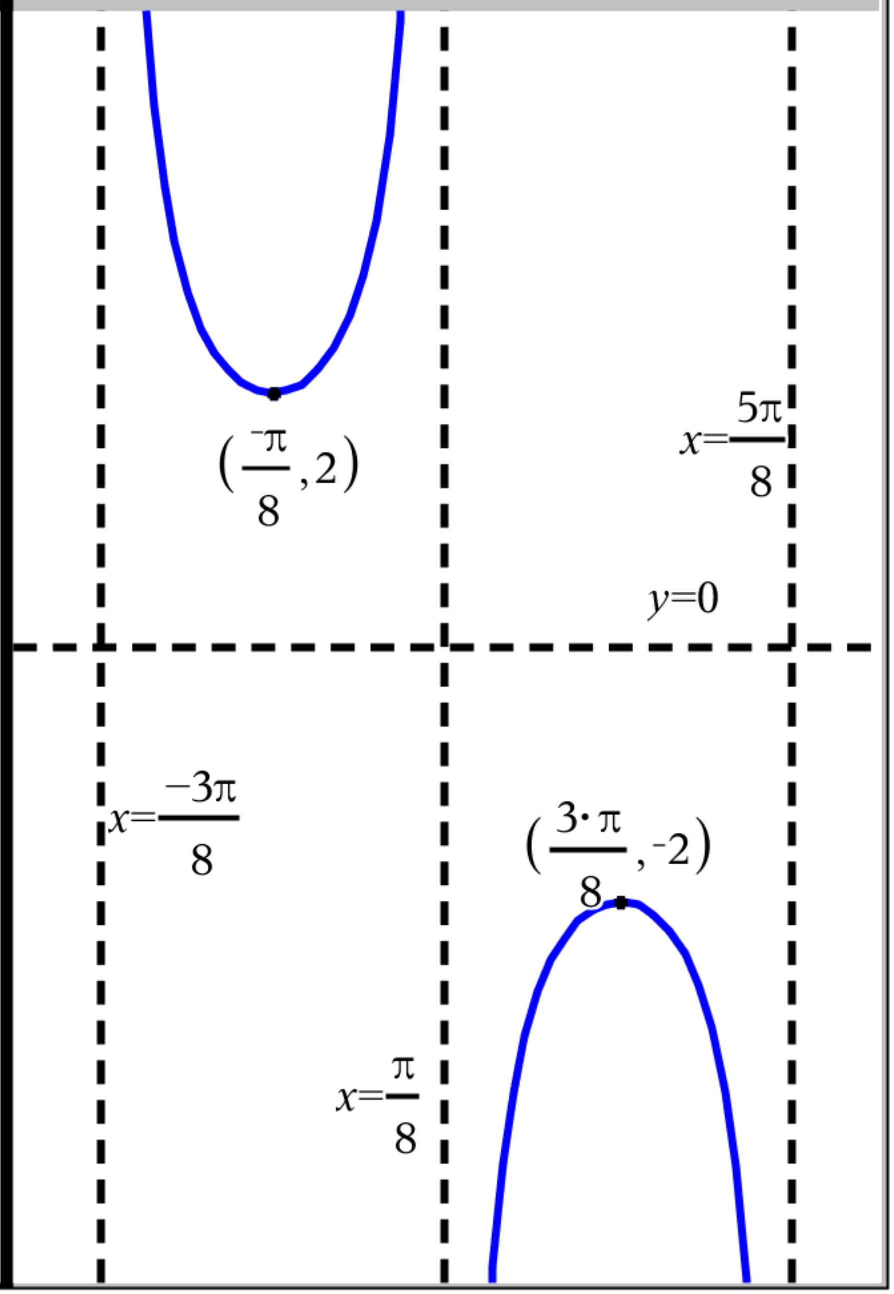
Finding a this is the distance from the midline to the local extremes

$|^{-}2 - 0| = 2$

$|0 - 2| = 2$

This is NOT a VERTICAL reflection

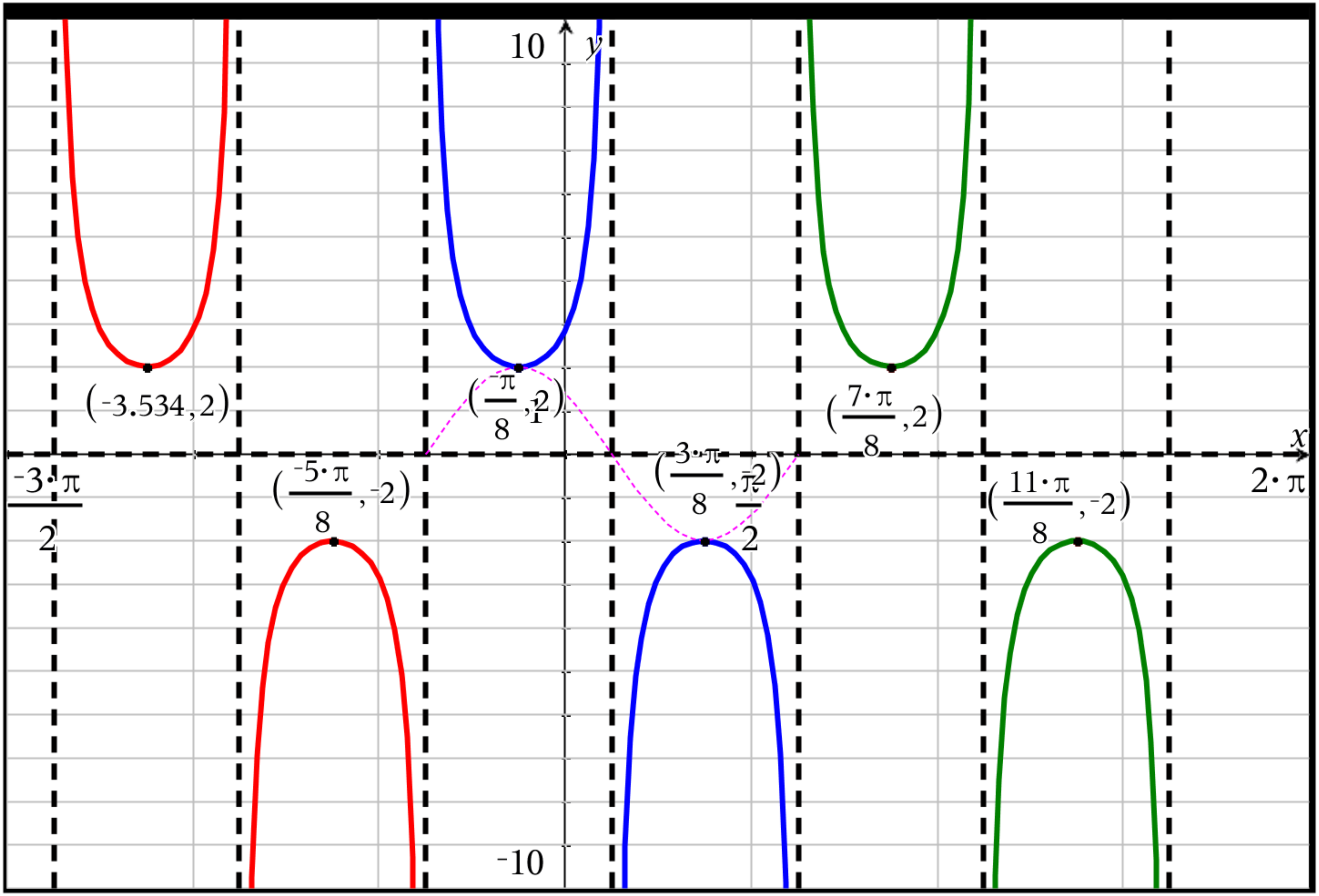
So $a = 2$



So we know that

$y = 2\csc(2(x + \frac{3\cdot\pi}{8})) + 0$

$y = 2\csc(2x + \frac{3\cdot\pi}{4})) + 0$


10
y
-10
x
-3·π/2
2·π
(-3.534,2)
(-π/8,2)
(-5·π/8,-2)
(3·π/8,-2)
(7·π/8,2)
(11·π/8,-2)
π/2

	A	B	C	D
=				
1	a	-2		
2		2/3		

A1 a

$y = {}^{-}2\ \sec\left(\frac{2}{3}x + \frac{\pi}{2}\right) + 2$

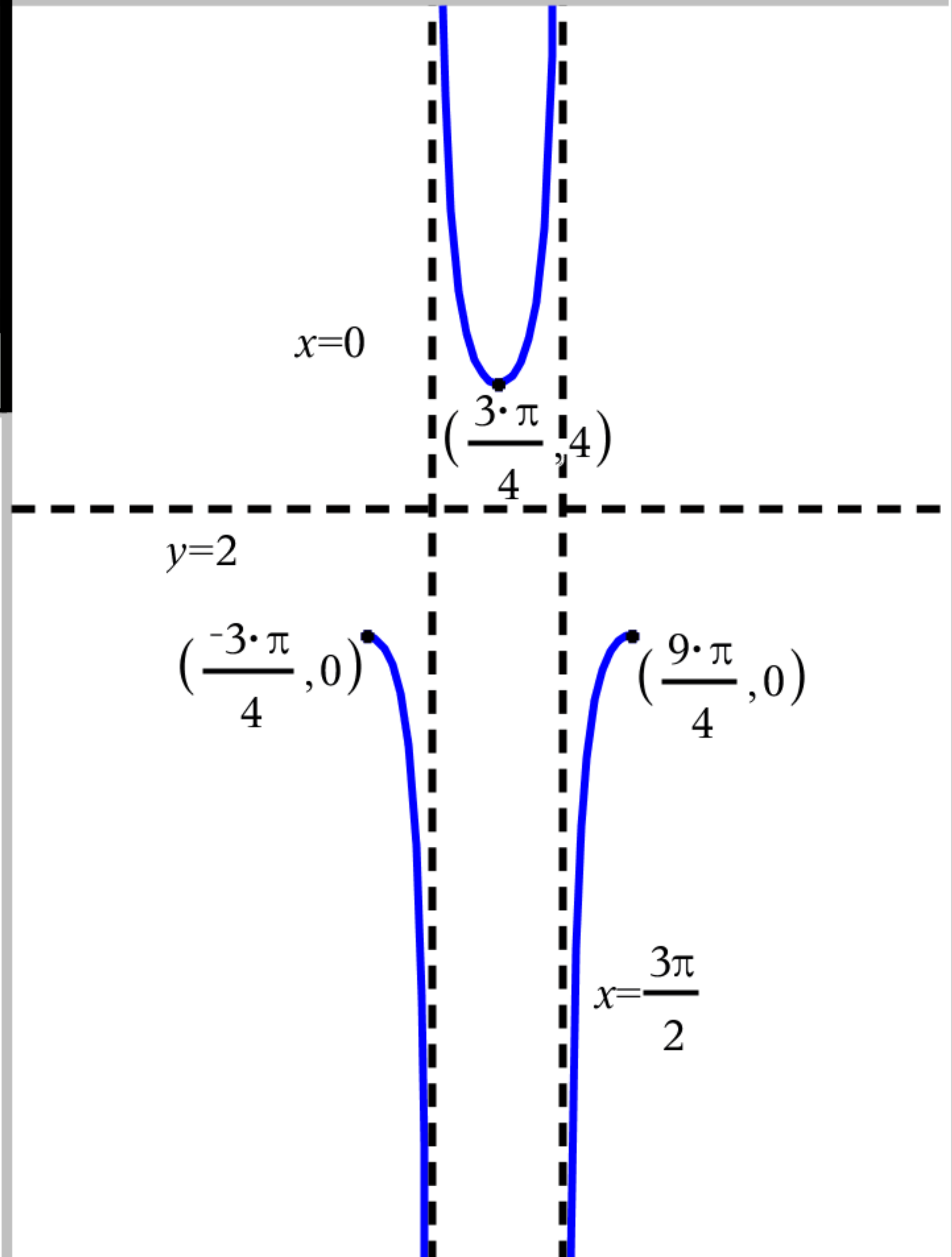
$y = {}^{-}2\ \sec\left(\frac{2}{3}\left(x + \frac{3\cdot\pi}{4}\right)\right) + 2$

Period $\left[\frac{{}^{-}3\cdot\pi}{4}, \frac{9\cdot\pi}{4}\right)$

Amplitude 2   Equation of Midline $y = 2$

Equation of Asymptotes $x = 0$ $x = \frac{3\cdot\pi}{2}$

Equation of All Asymptotes $x = 0 + \frac{3\cdot n\cdot\pi}{2}$ with $n \in \mathbb{Z}$



Finding b and horizontal shift

Shift to left because start $=\frac{^-3\cdot\pi}{4}$

We know y=asec(b(x $+\frac{3\cdot\pi}{4}$)) + d

Period of this function $[\frac{^-3\cdot\pi}{4},\frac{9\cdot\pi}{4})$

This gives us a period length of $\frac{9\cdot\pi}{4}-\frac{^-3\cdot\pi}{4}=3\cdot\pi$

$|b|=2\cdot\pi\div3\cdot\pi=2\cdot\pi\cdot\frac{1}{3\cdot\pi}=\frac{2}{3}$

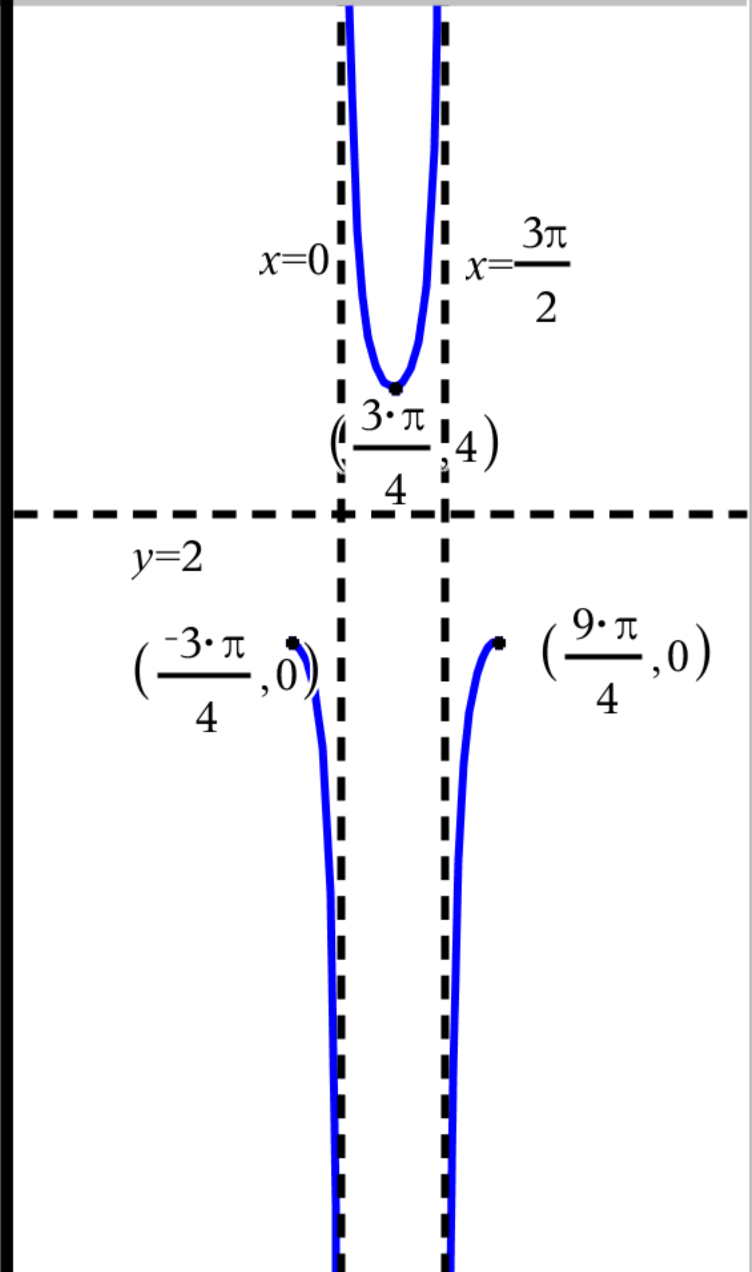
Since this IS NOT a reflection,

both a and b are positive

This means $y=a\ \sec(\frac{2}{3}(x+\frac{3\cdot\pi}{4}))+d$

Since the midline is y=2, this means

$y=a\ \sec(\frac{2}{3}(x+\frac{3\cdot\pi}{4}))+2$



Finding a this is the distance from the midline to the local extremes

$|0 - 2| = 2$

$|2 - 4| = 2$

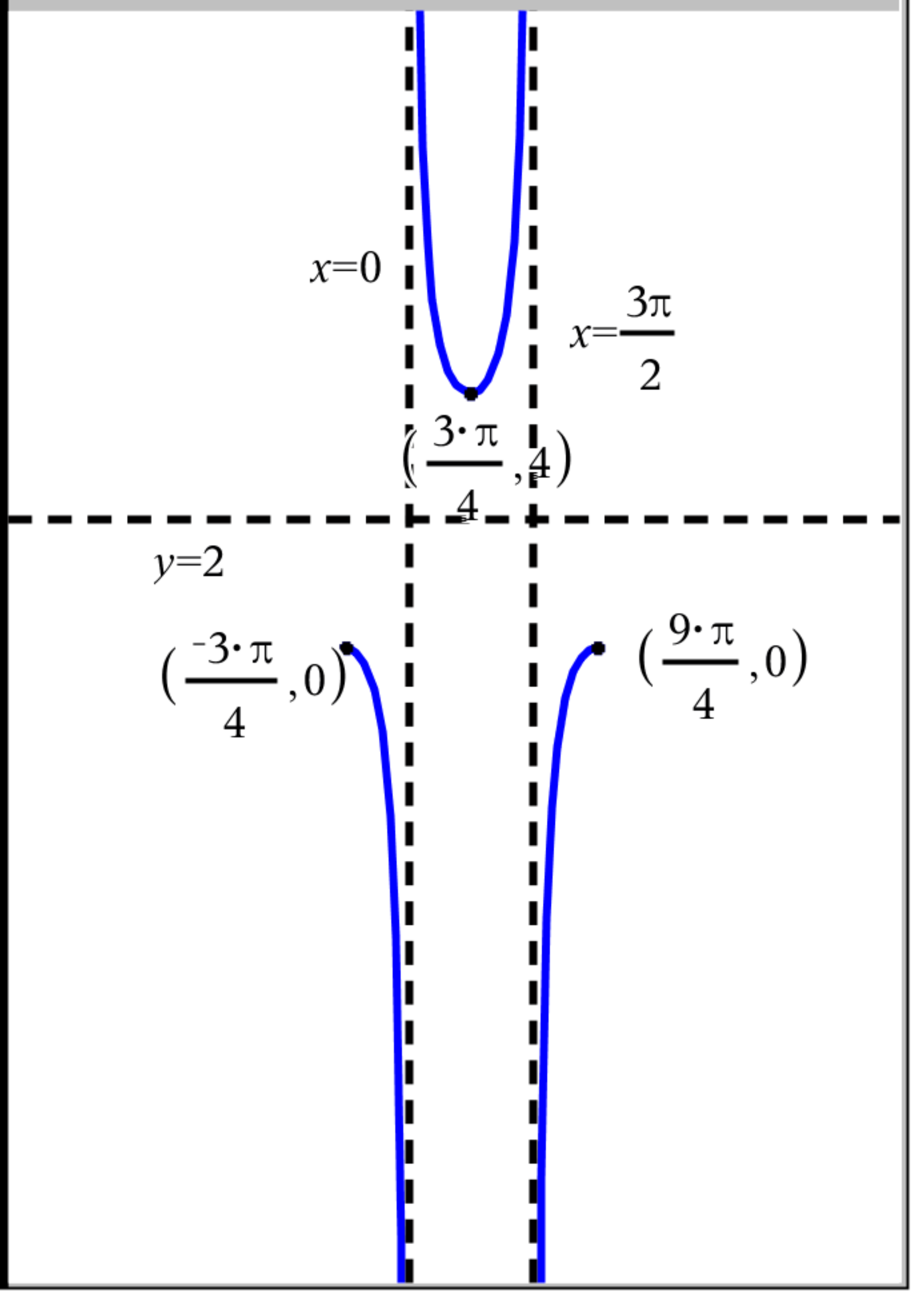
This is a VERTICAL reflection

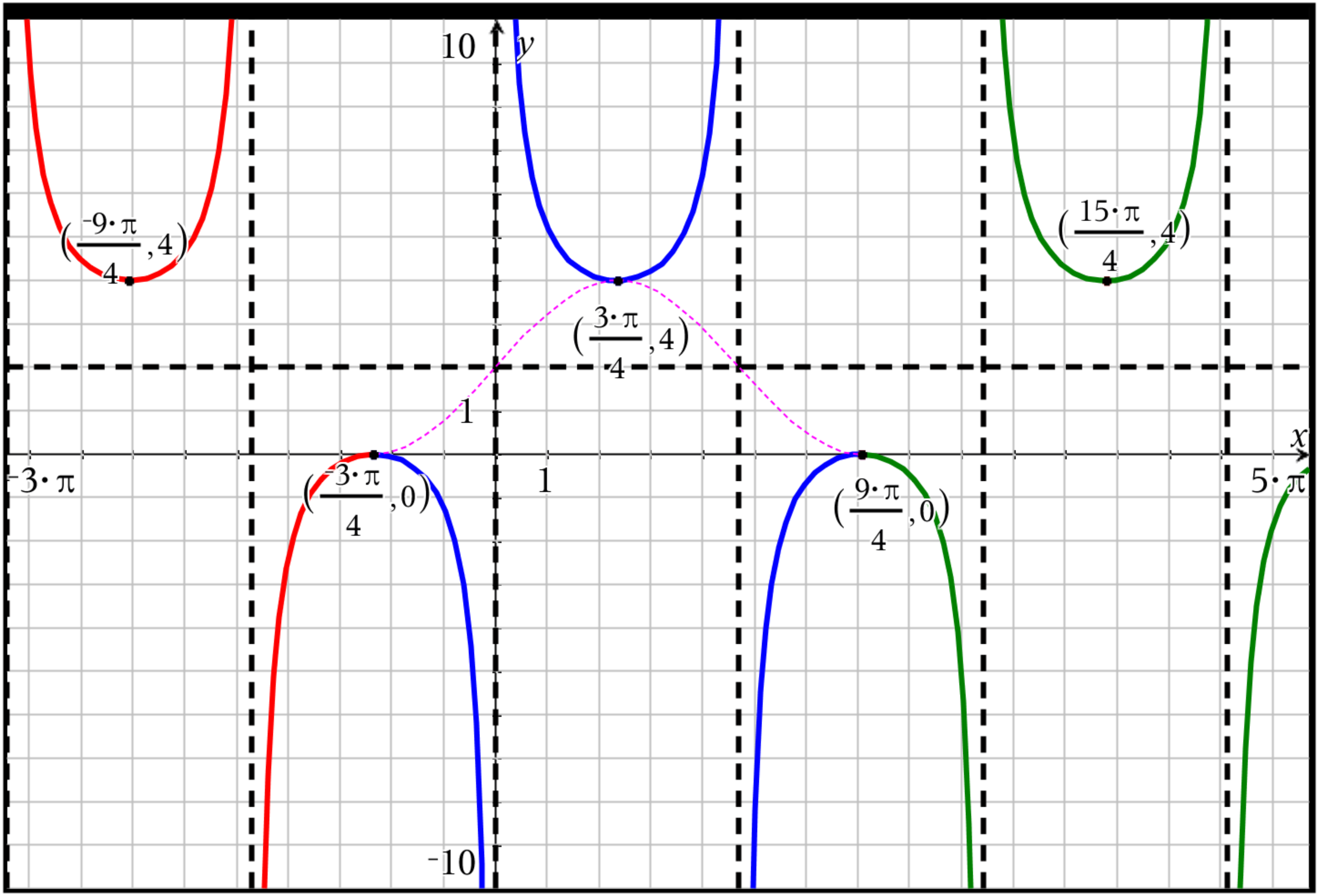
So $a = {}^{-}2$

So we know that

$$y = {}^{-}2\,\mathbf{sec}\left(\frac{2}{3}\left(\mathbf{x} + \frac{3\cdot\pi}{4}\right)\right) + 2$$

$$y = {}^{-}2\,\mathbf{sec}\left(\frac{2}{3}\mathbf{x} + \frac{\pi}{2}\right) + 2$$





10
y
(-9·π/4, 4)
(15·π/4, 4)
(3·π/4, 4)
1
x
-3·π
(-3·π/4, 0)
1
(9·π/4, 0)
5·π
-10

Problem 3

$y = 2\csc\left(2x - \frac{5\cdot\pi}{4}\right) + 0$

Period

$\left(\frac{5\cdot\pi}{8}, \frac{13\cdot\pi}{8}\right)$

Midline

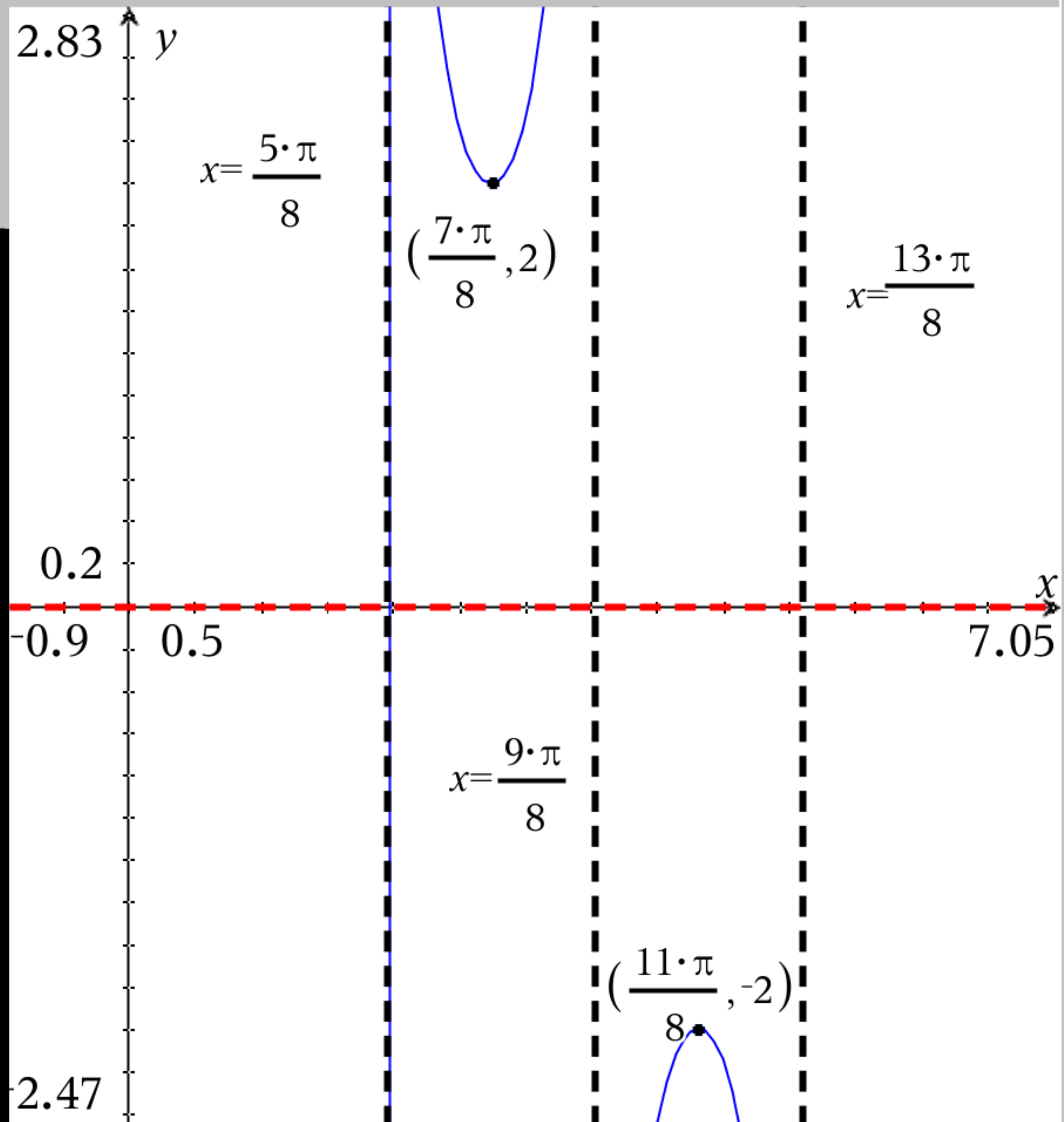
$y = 0$

Local Extremes

$\left(\frac{7\cdot\pi}{8}, 2\right)$ $\left(\frac{11\cdot\pi}{8}, -2\right)$

Asymptotes

$x = \frac{5\cdot\pi}{8}$ $x = \frac{9\cdot\pi}{8}$ $x = \frac{13\cdot\pi}{8}$



Step 1 What are the a, b,c d of the transformation?

a=2 b=2 c $=\frac{-5\cdot\pi}{4}$ d =0

Step 2: Factor INTERIOR function

$y=2\csc(2x-\frac{5\cdot\pi}{4})+0$ **NOTE: This asking you to do this** $\frac{-5\cdot\pi}{4}\div 2=\frac{-5\cdot\pi}{4}\cdot\frac{1}{2}=\frac{-5\cdot\pi}{8}$

$y=2\csc(2(x-\frac{5\cdot\pi}{8}))+0$

Note: Since $\frac{c}{b}=\frac{-5\cdot\pi}{8}$ we know that the horizontal shift is SHIFT RIGHT

Note: Since b = 2, We know that there is a horizontal compression

Note: Since we know there is SHIFT RIGHT

and we have factored form, A period begins at x $=\frac{5\cdot\pi}{8}$

Step 3: Determine the length of period using period $=\frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi\div 2=2\cdot\pi\cdot\frac{1}{2}=\pi$ So we know the period is π LONG

$a=2$ $b=2$ $c=\frac{-5\cdot\pi}{4}$ $d=0$ $y=2\csc(2x-\frac{5\cdot\pi}{4})+0$ $y=2\csc(2(x-\frac{5\cdot\pi}{8}))+0$

period length is π and ONE PERIOD starts at $\frac{5\cdot\pi}{8}$

Step 4: Determine the FIVE IMPORTANT x values

start $=\frac{5\cdot\pi}{8}$ (this is the first asymptote of cosecant)

start $+\frac{1\cdot\text{period}}{4}=\frac{5\cdot\pi}{8}+\frac{\pi}{4}=\frac{7\cdot\pi}{8}$ (this is where one of the local extremes occurs)

start $+\frac{2\cdot\text{period}}{4}=\frac{5\cdot\pi}{8}+\frac{\pi}{2}=\frac{9\cdot\pi}{8}$ (this is the second asymptote of cosecant)

start $+\frac{3\cdot\text{period}}{4}=\frac{5\cdot\pi}{8}+\frac{3\cdot\pi}{4}=\frac{11\cdot\pi}{8}$ (this is where one of the local extremes occurs)

start $+\text{period}=\frac{5\cdot\pi}{8}+\pi=\frac{13\cdot\pi}{8}$ (this is the third asymptote of cosecant) a=2 b=2 c = $\frac{-5\cdot\pi}{4}$ d =0 y=2 csc(2 x − $\frac{5\cdot\pi}{4}$) + 0 y=2 csc(2 (x − $\frac{5\cdot\pi}{8}$)) + 0

period length is π and ONE PERIOD starts at $\frac{5\cdot\pi}{8}$

"cool stuff" happens at x = $\left\{\frac{5\cdot\pi}{8},\frac{7\cdot\pi}{8},\frac{9\cdot\pi}{8},\frac{11\cdot\pi}{8}\ \frac{13\cdot\pi}{8}\right\}$

Step 5: Use d to determine midline y =0

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred

a = 2 b =2

Since a > 0 and b > 0 ,

we know that THERE IS NO vertical reflection and THERE IS NO horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

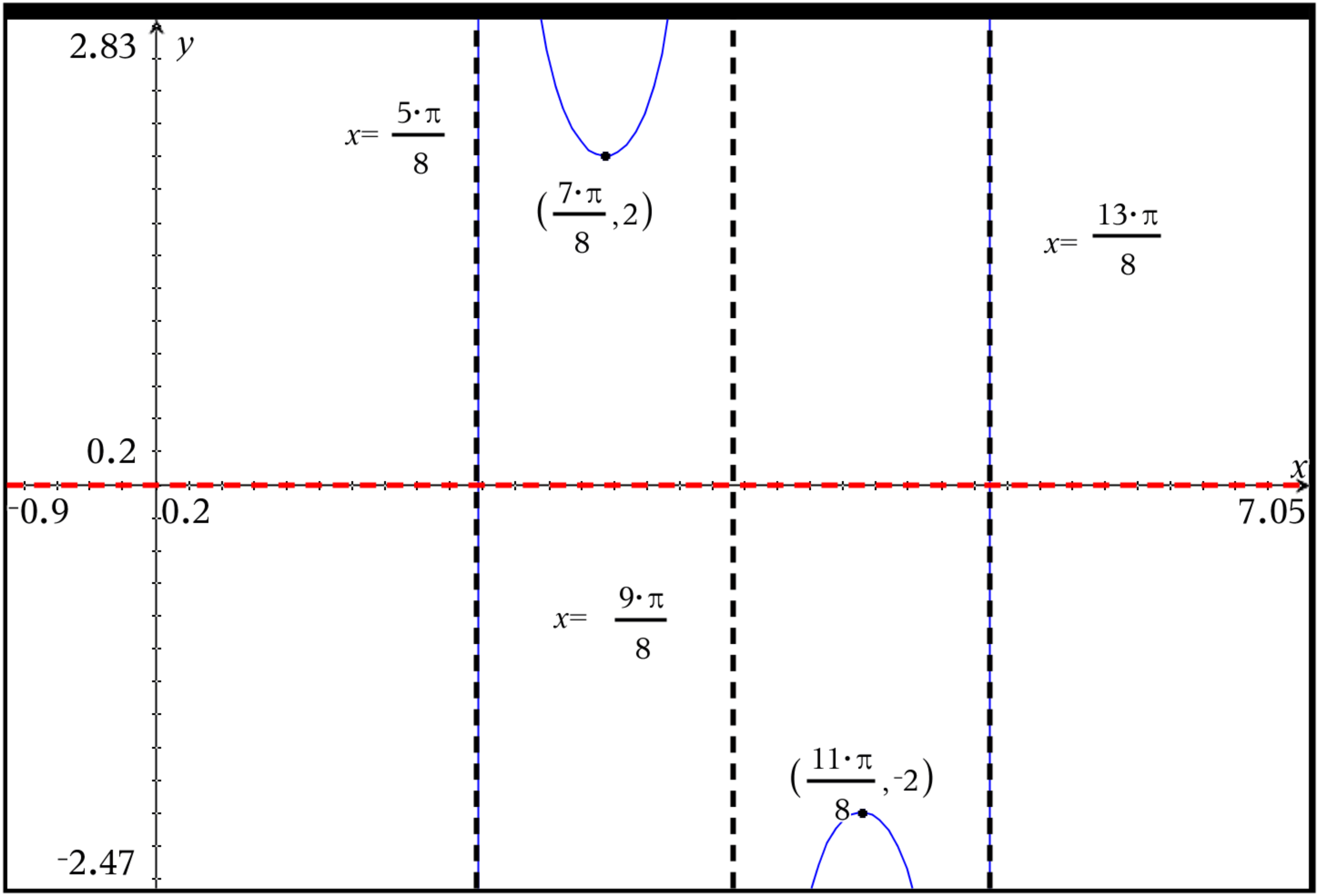
Since a =2 and d=0

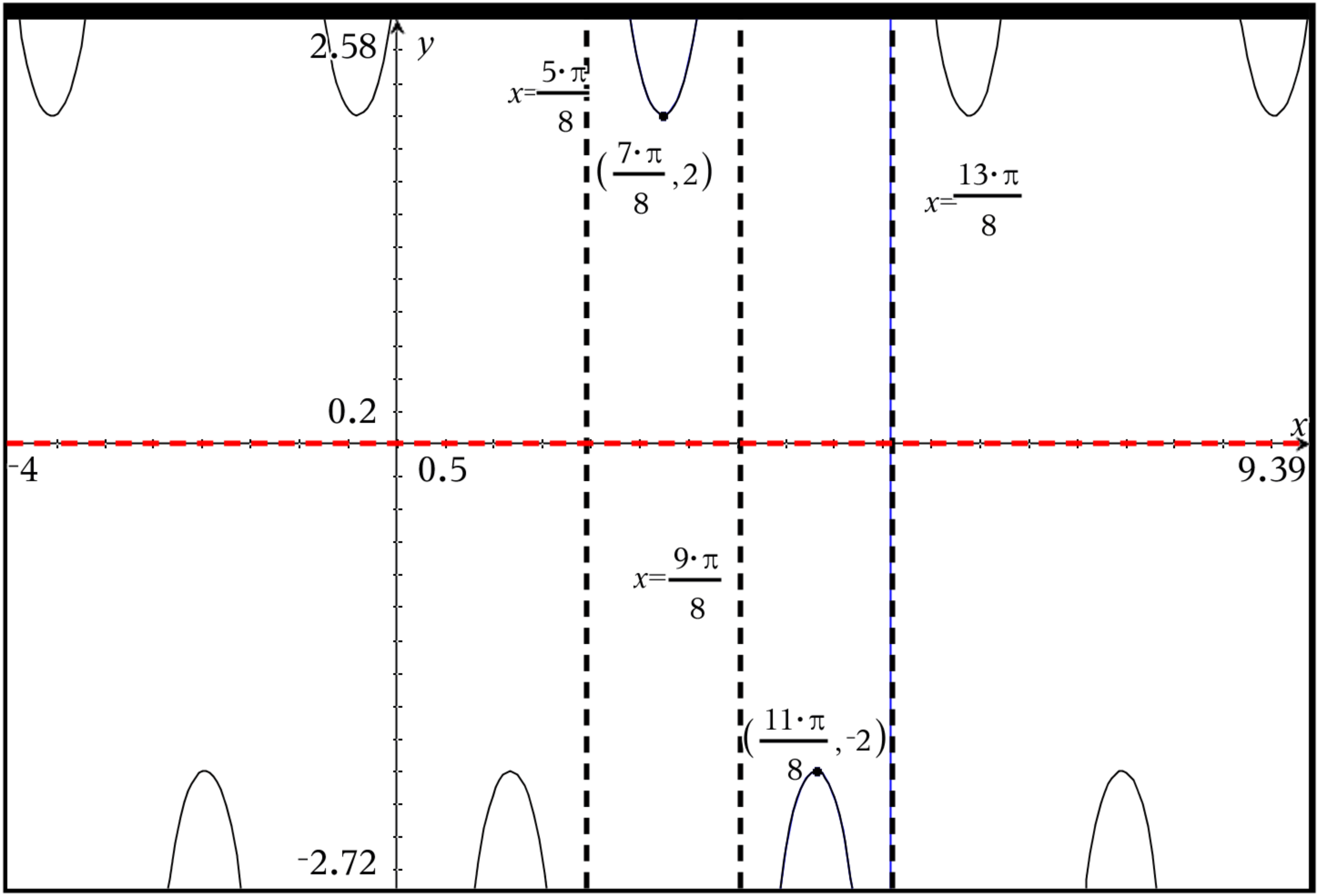
local extremes (top and bottom of "U" shape) occur at $y = d+|a| = 0+2 = 2$ (bottom of a "U")

$y = d-|a| = 0-2 = -2$ (top of a "U")

Step 8: Build local extremes

$\left(\frac{7\cdot\pi}{8},2\right)$ and $\left(\frac{11\cdot\pi}{8},-2\right)$


2.83
y
0.2
-0.9
0.2
x
7.05
-2.47
x= 5·π/8
(7·π/8, 2)
x= 13·π/8
x= 9·π/8
(11·π/8, -2)



2.58
y
$x=\frac{5\cdot\pi}{8}$
$(\frac{7\cdot\pi}{8},2)$
$x=\frac{13\cdot\pi}{8}$
0.2
x
-4
0.5
9.39
$x=\frac{9\cdot\pi}{8}$
$(\frac{11\cdot\pi}{8},-2)$
-2.72

Problem 4

$y=-3\csc\left(\frac{3\cdot\pi}{2}x-6\cdot\pi\right)+4$

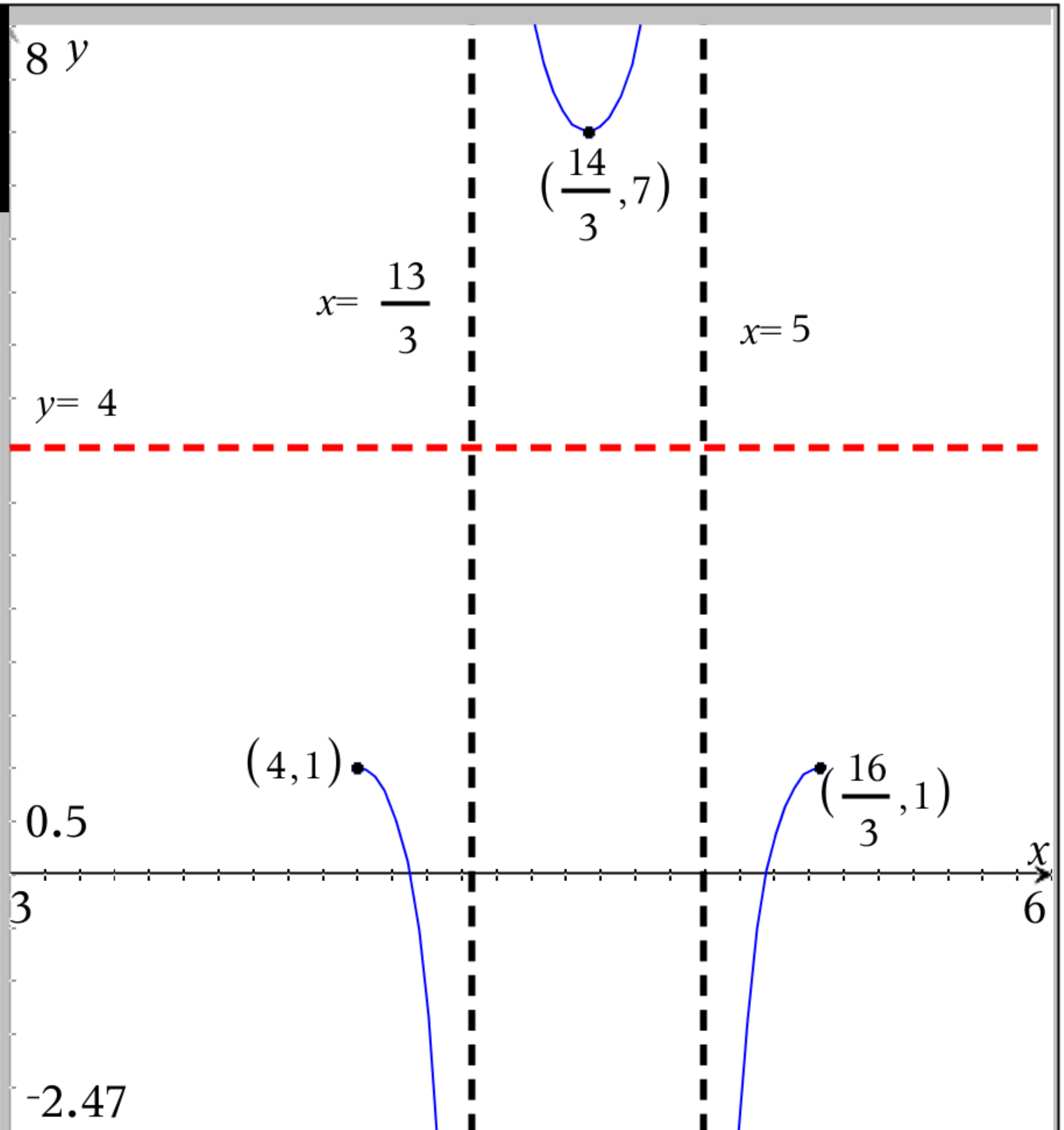
Period	Midline
$\left(4,\frac{16}{3}\right)$	$y=4$

Local Extremes

$(4,1)$ $\left(\frac{14}{3},7\right)$ $\left(\frac{16}{3},1\right)$

Asymptotes

$x=\frac{13}{3}$ $x=5$



Step 1 What are the a, b,c d of the transformation?

a= $^-3$ b= $\frac{3\cdot\pi}{2}$ c = $^-6\cdot\pi$ d = 4

Step 2: Factor INTERIOR function

y= $^-3$ $\mathbf{sec}\left(\frac{3\cdot\pi}{2}\mathbf{x} - 6\cdot\pi\right) + 4$ **NOTE: This asking you to do this** $^-6\cdot\pi \div \frac{3\cdot\pi}{2} = {}^-6\cdot\pi \cdot \frac{2}{3\cdot\pi} = {}^-4$

y= $^-3$ $\mathbf{csc}\left(\frac{3\cdot\pi}{2}(\mathbf{x} - 4)\right) + 4$

Note: Since $\frac{c}{b}$ = $^-4$ we know that the horizontal shift is SHIFT RIGHT

Note: Since b = $\frac{3\cdot\pi}{2}$, We know that there is a horizontal compression

Note: Since we know there is SHIFT RIGHT

and we have factored form, A period begins at x = 4

Step 3: Determine the length of period using period $= \frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi \div \frac{3\cdot\pi}{2} = 2\cdot\pi \cdot \frac{2}{3\cdot\pi} = \frac{4}{3}$ So we know the period is $\frac{4}{3}$ LONG

$a = {}^{-}3$ $b = \frac{3\cdot\pi}{2}$ $c = {}^{-}6\cdot\pi$ $d = 4$ $y = {}^{-}3\,\sec\left(\frac{3\cdot\pi}{2}x - 6\cdot\pi\right) + 4$ $y = {}^{-}3\,\sec\left(\frac{3\cdot\pi}{2}(x - 4)\right) + 4$

period length is $\frac{4}{3}$ and ONE PERIOD starts at 4

Step 4: Determine the FIVE IMPORTANT x values

start $= 4$ (this is the first local extreme of secant)

start $+ \frac{1\cdot \textbf{period}}{4} = 4 + \frac{1}{3} = \frac{13}{3}$ (this is where first asymptote occurs)

start $+ \frac{2\cdot \textbf{period}}{4} = 4 + \frac{2}{3} = \frac{14}{3}$ (this is the second local extreme of secant)

start $+ \frac{3\cdot \textbf{period}}{4} = 4 + 1 = 5$ (this is the second asymptote of secant)

start $+ \textbf{period} = 4 + \frac{4}{3} = \frac{16}{3}$ (this is the last local extreme of secant) period length is $\frac{4}{3}$ and ONE PERIOD starts at 4

"cool stuff" happens at x = $\{4, \frac{13}{3}, \frac{14}{3}, 5, \frac{16}{3}\}$

Step 5: Use d to determine midline $y = 4$

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred

$a = -3 \quad b = \frac{3 \cdot \pi}{2}$

Since a $<$ 0 and b $>$ 0 ,

we know that THERE IS A vertical reflection and THERE IS NO horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

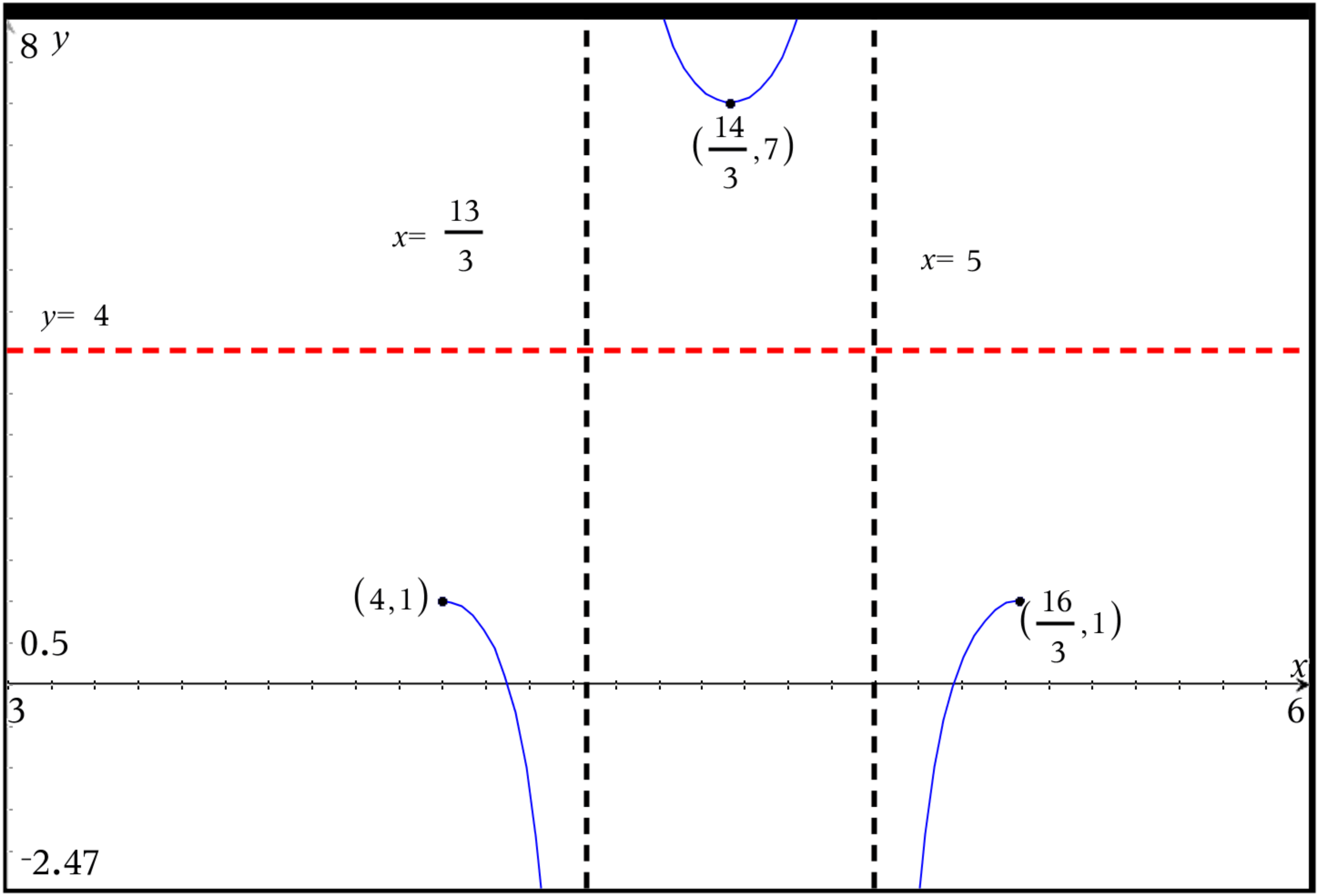
Since a $= -3$ and d$=4$

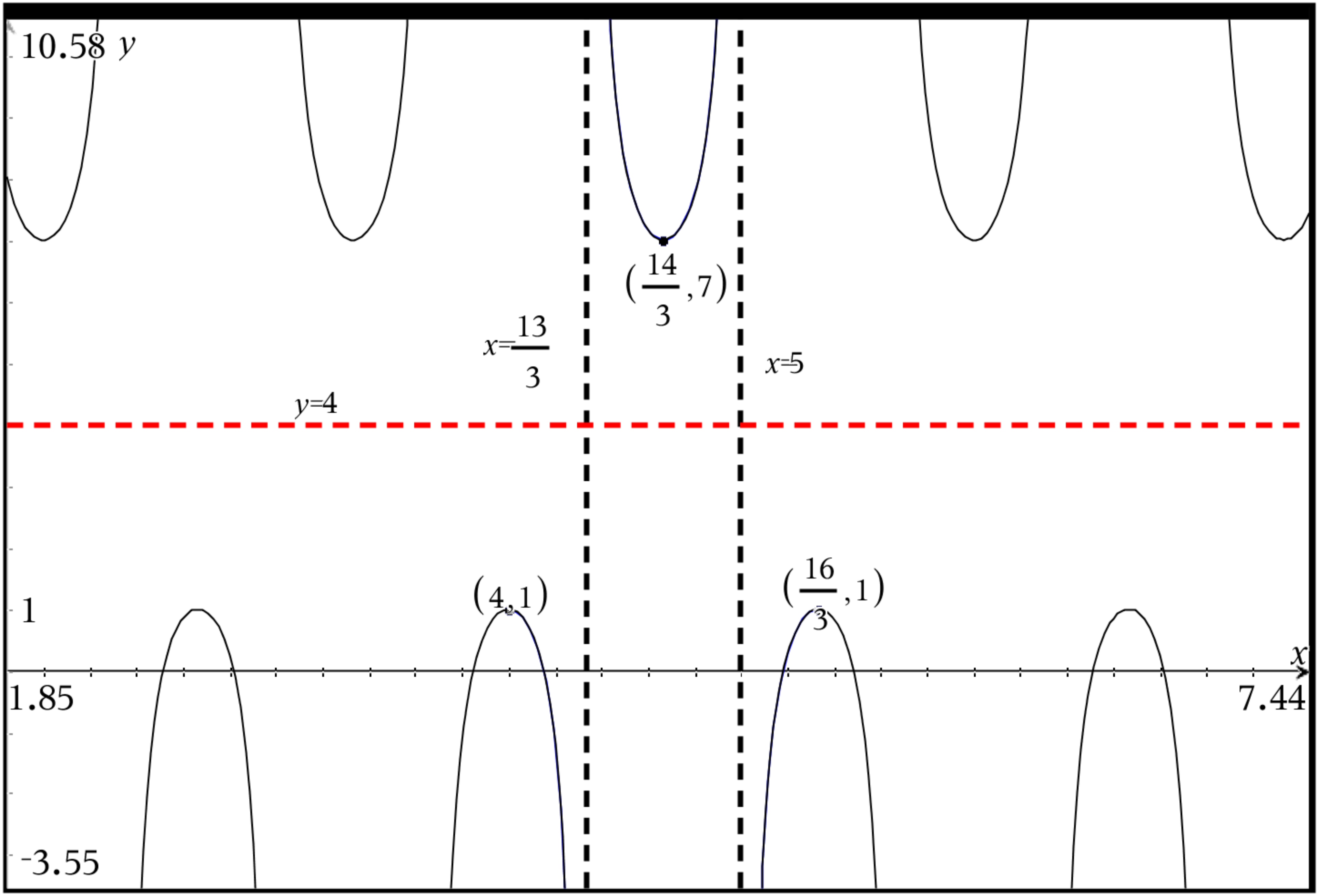
local extremes (top and bottom of "U" shape) occur at $y = d + |a| = 4 + 3 = 7$ (bottom of a "U")

$y = d - |a| = 4 - 3 = 1$ (top of a "U")

Step 8: Build local extremes

$(4, 1)$ and $(\frac{14}{3}, 7)$ and $(\frac{16}{3}, 1)$


8
y
(14/3, 7)
x= 13/3
x= 5
y= 4
(4,1)
(16/3, 1)
0.5
x
3
6
-2.47


10.58 y
(14/3, 7)
x=13/3
x=5
y=4
(4,1)
(16/3, 1)
1
x
1.85
7.44
-3.55

Problem 5

	A	B	C
=			
1	a	-3/2	
2	b	6	

A1 *a*

$y=\frac{-3}{2}\cos(6x + 5\cdot\pi) + 1$

Period $\left(\frac{-5\cdot\pi}{6},\frac{-\pi}{2}\right)$

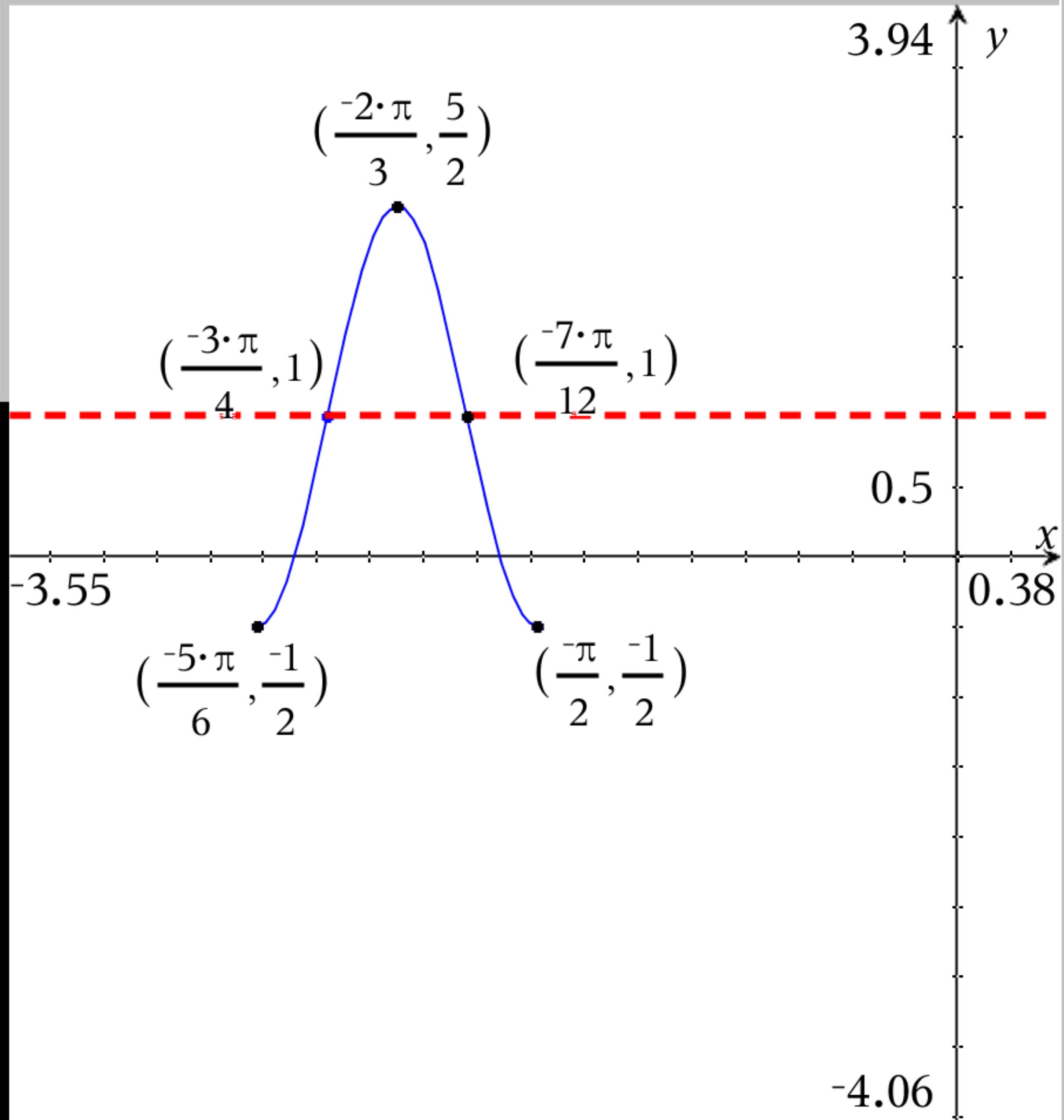
Midline $y = 1$

Local Extremes

$\left(\frac{-5\cdot\pi}{6},1\right)$ $\left(\frac{-2\cdot\pi}{3},1\right)$ $\left(\frac{-\pi}{2},\frac{-1}{2}\right)$

Intersections with midline

$\left(\frac{-3\cdot\pi}{4},1\right)$ $\left(\frac{-7\cdot\pi}{12},1\right)$



Step 1 What are the a, b,c d of the transformation?

a= $\frac{-3}{2}$ b= 6 c = $5\cdot\pi$ d = 1

Step 2: Factor INTERIOR function

$y=\frac{-3}{2}\cos(6x + 5\cdot\pi) + 1$ **NOTE: This asking you to do this** $5\cdot\pi \div 6 = 5\cdot\pi \cdot \frac{1}{6} = \frac{5\cdot\pi}{6}$

$y=\frac{-3}{2}\csc\left(6\left(x + \frac{5\cdot\pi}{6}\right)\right) + 1$

Note: Since $\frac{c}{b} = \frac{5\cdot\pi}{6}$ we know that the horizontal shift is SHIFT LEFT

Note: Since b = 6, We know that there is a horizontal compression

Note: Since we know there is SHIFT LEFT

and we have factored form, A period begins at x = $\frac{-5\cdot\pi}{6}$

Step 3: Determine the length of period using period $= \frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi \div 6 = 2\cdot\pi \cdot \frac{1}{6} = \frac{\pi}{3}$ So we know the period is $\frac{\pi}{3}$ LONG

$a=\frac{-3}{2}$ $b=6$ $c=5\cdot\pi$ $d=1$ $y=\frac{-3}{2}\cos(6x+5\cdot\pi)+1$ $y=\frac{-3}{2}\cos\left(6\left(x+\frac{5\cdot\pi}{6}\right)\right)+1$

period length is $\frac{\pi}{3}$ and ONE PERIOD starts at $\frac{-5\cdot\pi}{6}$

Step 4: Determine the FIVE IMPORTANT x values

start $=\frac{-5\cdot\pi}{6}$ (this is the first local extreme of cosine)

start $+\frac{1\cdot \textbf{period}}{4}=\frac{-5\cdot\pi}{6}+\frac{\pi}{12}=\frac{-3\cdot\pi}{4}$ (this is where first intersection of midline occurs)

start $+\frac{2\cdot \textbf{period}}{4}=\frac{-5\cdot\pi}{6}+\frac{\pi}{6}=\frac{-2\cdot\pi}{3}$ (this is the second local extreme of cosine)

start $+\frac{3\cdot \textbf{period}}{4}=\frac{-5\cdot\pi}{6}+\frac{\pi}{4}=\frac{-7\cdot\pi}{12}$ (this is where first intersection of midline occurs)

start $+\textbf{period}=\frac{-5\cdot\pi}{6}+\frac{\pi}{3}=\frac{-\pi}{2}$ (this is the last local extreme of cosine) a= [illegible]/2 b=6 c=$5\cdot\pi$ d=1   y= [illegible]/2 cos(6x + $5\cdot\pi$) + 1   y= [illegible]/2 cos(6(x + [illegible]/6)) + 1

period length is $\frac{\pi}{3}$ and ONE PERIOD starts at $\frac{-5\cdot\pi}{6}$

"cool stuff" happens at x =$\left\{\frac{-5\cdot\pi}{6}, \frac{-3\cdot\pi}{4}, \frac{-2\cdot\pi}{3}, \frac{-7\cdot\pi}{12}, \frac{-\pi}{2}\right\}$

Step 5: Use d to determine midline $y=1$

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred $a=\frac{-3}{2}$ $b=6$

Since a $<$ 0 and b $>$ 0 ,

we know that THERE IS A vertical reflection and THERE IS NO horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

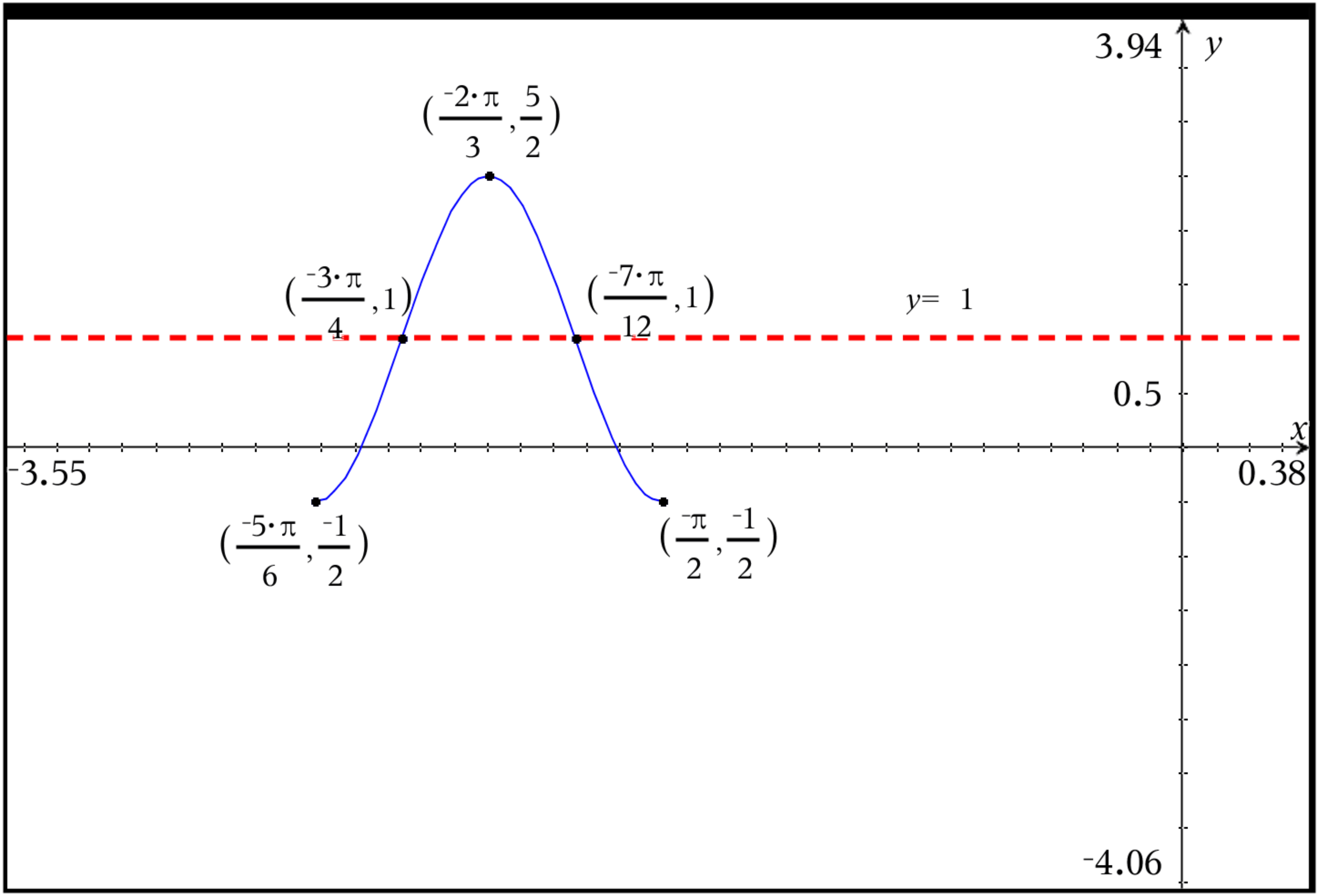
Since $a=\frac{-3}{2}$ and d=1

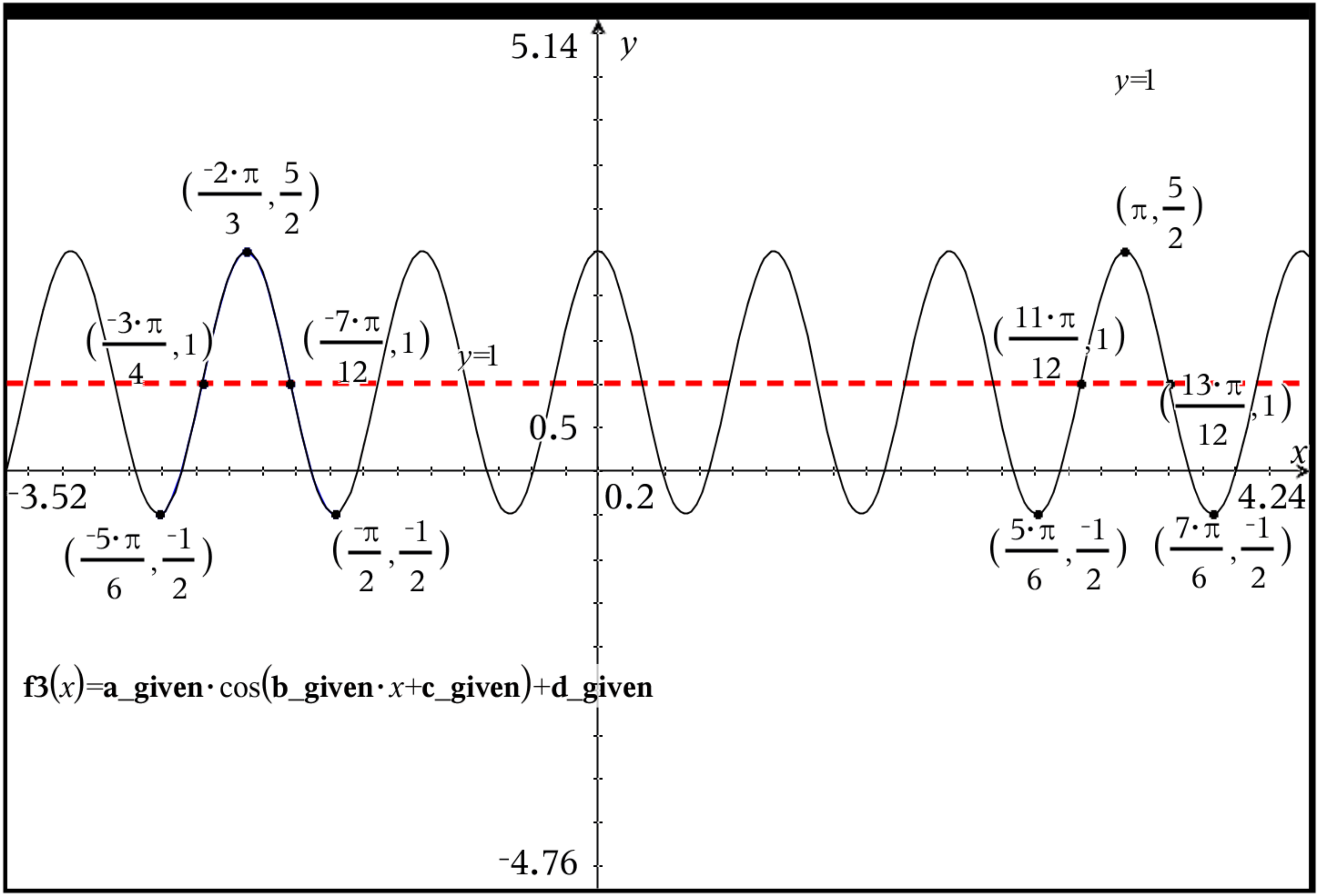
local extremes (top and bottom of "U" shape) occur at $y=d+|a|=1+\frac{3}{2}=\frac{5}{2}$ (TOP of a "U")

$y=d-|a|=1-\frac{3}{2}=\frac{-1}{2}$ (BOTTOM of a "U")

Step 8: Build local extremes

$\left(\frac{-5\cdot\pi}{6}, \frac{-1}{2}\right)$ and $\left(\frac{-2\cdot\pi}{3}, \frac{5}{2}\right)$ and $\left(\frac{-\pi}{2}, \frac{-1}{2}\right)$


3.94
y
(⁻2·π/3, 5/2)
(⁻3·π/4, 1)
(⁻7·π/12, 1)
y= 1
0.5
x
⁻3.55
0.38
(⁻5·π/6, ⁻1/2)
(⁻π/2, ⁻1/2)
⁻4.06


5.14
y
y=1
(−2·π/3, 5/2)
(π, 5/2)
(−3·π/4, 1)
(−7·π/12, 1)
y=1
(11·π/12, 1)
(13·π/12, 1)
0.5
−3.52
0.2
4.24
x
(−5·π/6, −1/2)
(−π/2, −1/2)
(5·π/6, −1/2)
(7·π/6, −1/2)
f3(x)=a_given·cos(b_given·x+c_given)+d_given
−4.76

Problem 6

	A
=	
1	SHIFT LEFT
2	SHIFT DOWN
3	Horizontal REFLECTIO
4	STRETCH period
5	Vertically STRETCH
6	
7	
8	
9	
10	
11	

A1 "SHIFT LEFT"

Fact 1: Shift LEFT implies $(x+\frac{18\cdot\pi}{5})$

inside the secant function

So we know $y = a \sec(b(x+\frac{18\cdot\pi}{5}))+d$

start $= \frac{-18\cdot\pi}{5}$

Fact 2: Shift DOWN implies $d = -8$

outside the secant function

So we know $y = a \sec(b(x+\frac{18\cdot\pi}{5}))-8$

Fact 3: There is a HORIZONTAL reflection

This means $b < 0$

Fact 4: There is a stretch of period to $48\cdot\pi$

$0<|b|<1$

Use $|b| = \frac{2\cdot\pi}{\textbf{period}} = 2\cdot\pi \div 48\cdot\pi = 2\cdot\pi \cdot \frac{1}{48\cdot\pi} = \frac{1}{24}$

Fact 3 and Fact 4 tell us $|b|=\frac{1}{24}$ that b $=\frac{^-1}{24}$ because of the horizontal reflection

We now know y =a sec($\frac{^-1}{24}$(x+**h_shift** ▸ $\frac{18\cdot\pi}{5}$))-8

Fact 5: Vertically Stretch by a factor of $\frac{15}{2}$

and the fact that NO vertical reflection has occurred we know a $=\frac{15}{2}$

We now know y $=\frac{15}{2}$sec($\frac{^-1}{24}$(x+$\frac{18\cdot\pi}{5}$))-8

Problem 7

	A	B	C
=			
1	a	15/2	
2	b	-1/24	

A1 *a*

$y=\frac{15}{2}\sec\left(\frac{-1}{24}x-\frac{3\cdot\pi}{20}\right)-8$

Period

$\left(\frac{-18\cdot\pi}{5},\frac{222\cdot\pi}{5}\right)$

Midline

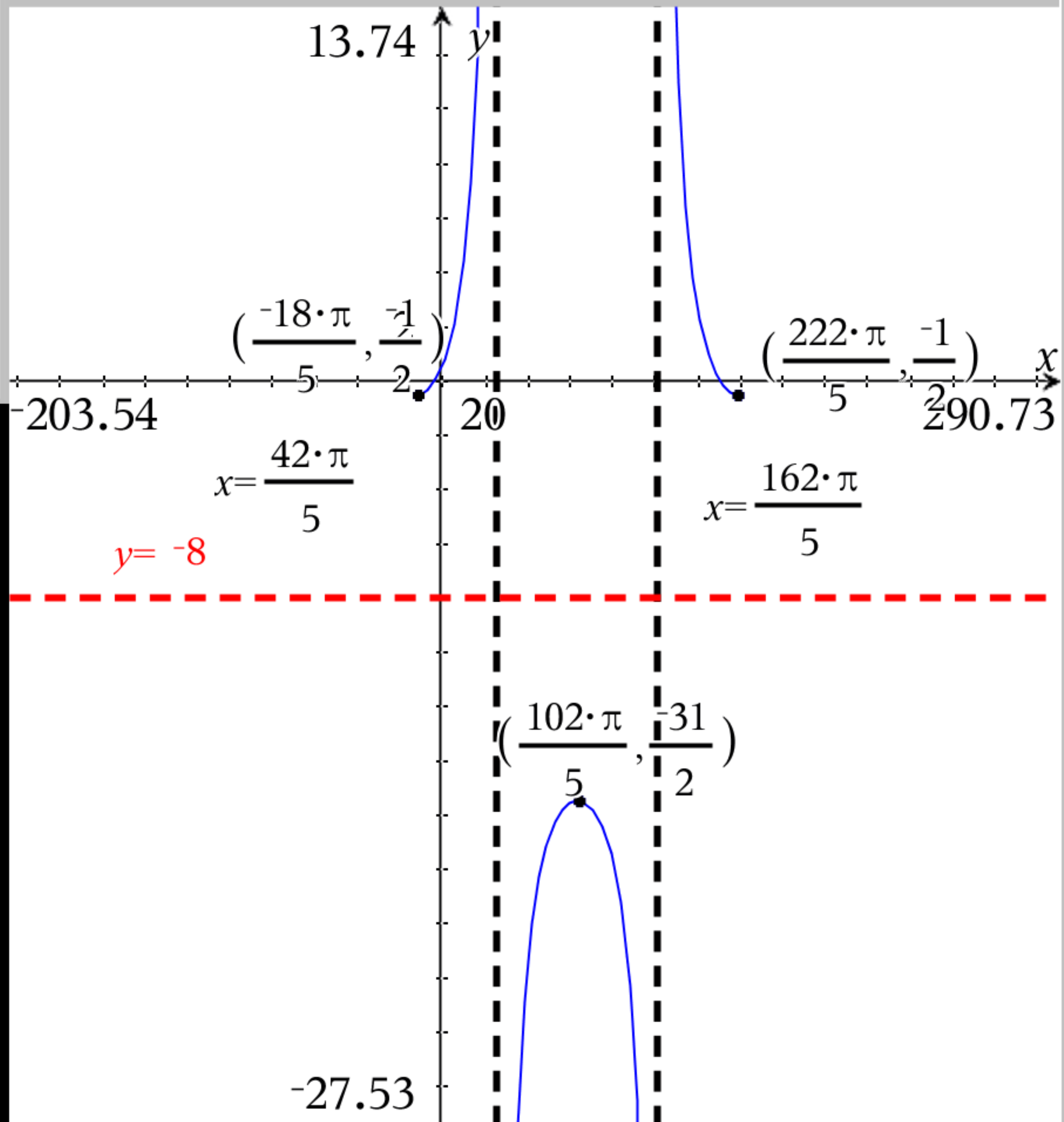
$y=-8$

Local Extremes

$\left(\frac{-18\cdot\pi}{5},\frac{-1}{2}\right)$ $\left(\frac{102\cdot\pi}{5},\frac{-31}{2}\right)$ $\left(\frac{222\cdot\pi}{5},\frac{-1}{2}\right)$

Asymptotes

$x=\frac{42\cdot\pi}{5}$ $x=\frac{162\cdot\pi}{5}$



Step 1 What are the a, b,c d of the transformation?

$a=\frac{15}{2}$ $b=\frac{-1}{24}$ $c=\frac{-3\cdot\pi}{20}$ $d=-8$

Step 2: Factor INTERIOR function

$y=\frac{15}{2}\sec\left(\frac{-1}{24}x-\frac{3\cdot\pi}{20}\right)-$ **NOTE: This asking you to do this** $\frac{-3\cdot\pi}{20}\div\frac{-1}{24}=\frac{-3\cdot\pi}{20}\cdot -24=\frac{18\cdot\pi}{5}$

$y=\frac{15}{2}\sec\left(\frac{-1}{24}\left(x+\frac{18\cdot\pi}{5}\right)\right)-8$

Note: Since $\frac{c}{b}=\frac{18\cdot\pi}{5}$ we know that the horizontal shift is SHIFT LEFT

Note: Since $b=\frac{-1}{24}$, We know that there is a horizontal stretch

Note: Since we know there is SHIFT LEFT

and we have factored form, A period begins at $x=\frac{-18\cdot\pi}{5}$

Step 3: Determine the length of period using $\text{period}=\frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi\div\frac{-1}{24}=2\cdot\pi\cdot 24=48\cdot\pi$ So we know the period is $48\cdot\pi$ LONG

$a=\frac{15}{2}$ $b=\frac{-1}{24}$ $c=\frac{-3\cdot\pi}{20}$ $d=-8$ $y=\frac{15}{2}\mathbf{sec}\left(\frac{-1}{24}\mathbf{x}-\frac{3\cdot\pi}{20}\right)-8$ $y=\frac{15}{2}\mathbf{sec}\left(\frac{-1}{24}\left(\mathbf{x}+\frac{18\cdot\pi}{5}\right)\right)-8$

period length is $48\cdot\pi$ and ONE PERIOD starts at $\frac{-18\cdot\pi}{5}$

Step 4: Determine the FIVE IMPORTANT x values

start $=\frac{-18\cdot\pi}{5}$ (this is the first local extreme of secant)

start $+\frac{1\cdot\textbf{period}}{4}=\frac{-18\cdot\pi}{5}+12\cdot\pi=\frac{42\cdot\pi}{5}$ (this is where first asymptote occurs)

start $+\frac{2\cdot\textbf{period}}{4}=\frac{-18\cdot\pi}{5}+24\cdot\pi=\frac{102\cdot\pi}{5}$ (this is the second local extreme of secant)

start $+\frac{3\cdot\textbf{period}}{4}=\frac{-18\cdot\pi}{5}+36\cdot\pi=\frac{162\cdot\pi}{5}$ (this is the second asymptote of secant)

start $+\textbf{period}=\frac{-18\cdot\pi}{5}+48\cdot\pi=\frac{222\cdot\pi}{5}$ (this is the last local extreme of secant)

$a=\frac{\quad}{2}$ $b=\frac{\quad}{24}$ $c=\frac{\quad}{20}$ $d=-8$ $y=\frac{\quad}{2}\sec\left(\frac{\quad}{24}x-\frac{\quad}{20}\right)-8$ $y=\frac{\quad}{2}\sec\left(\frac{\quad}{24}(x+\quad)\right)-8$

period length is $48\cdot\pi$ and ONE PERIOD starts at $\frac{-18\cdot\pi}{5}$

"cool stuff" happens at x $=\left\{\frac{-18\cdot\pi}{5},\frac{42\cdot\pi}{5},\frac{102\cdot\pi}{5},\frac{162\cdot\pi}{5},\frac{222\cdot\pi}{5}\right\}$

Step 5: Use d to determine midline y =**d_given**

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred $a=\frac{15}{2}$ $b=\frac{-1}{24}$

Since a $>$ 0 and b $<$ 0 ,

we know that NO vertical reflection and THERE IS horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

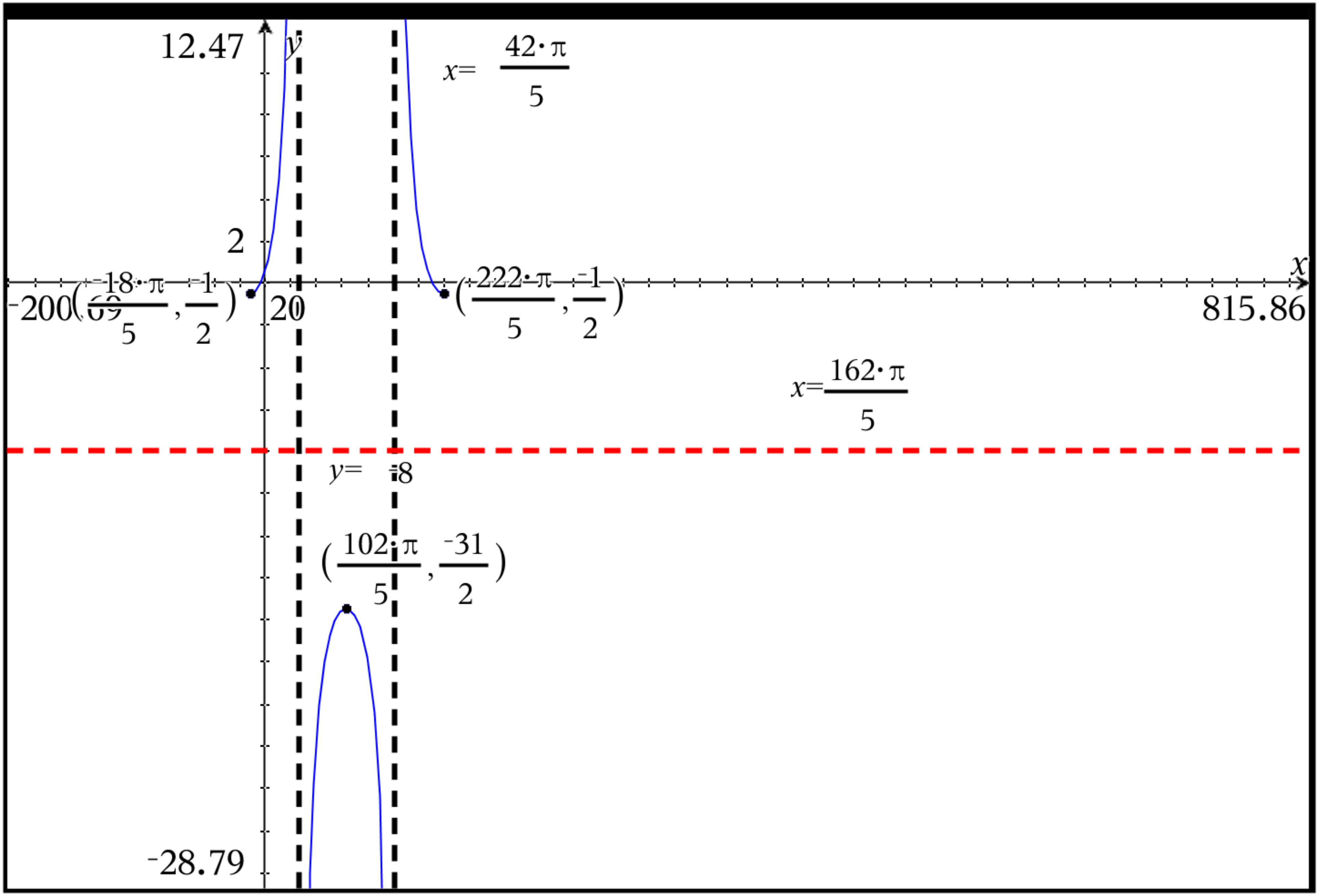
Since $a=\frac{15}{2}$ and $d=-8$

local extremes (top and bottom of "U" shape) occur at $y=d+|a|=-8+\frac{15}{2}=\frac{-1}{2}$ (bottom of a "U")

$y=d-|a|=-8-\frac{15}{2}=\frac{-31}{2}$ (top of a "U")

Step 8: Build local extremes

$\left(\frac{-18\cdot\pi}{5},\frac{-31}{2}\right)$ and $\left(\frac{102\cdot\pi}{5},\frac{-1}{2}\right)$ and $\left(\frac{222\cdot\pi}{5},\frac{-31}{2}\right)$


12.47
y
x=
42·π
5
2
x
-200
(-69
5
,
-1
2
)
20
(222·π
5
,
-1
2
)
815.86
x=162·π
5
y= -8
(102·π
5
,
-31
2
)
-28.79

Problem 8

	A	B	C
=			
1	a	-4	
2	b	1*π/6	

A1 *a*

$y = {}^{-}4\sec\left(\frac{\pi}{6}x + \frac{\pi}{6}\right) - 2$

$y = {}^{-}4\sec\left(\frac{\pi}{6}(x + 1)\right) - 2$

Period

(-1,11)

Midline

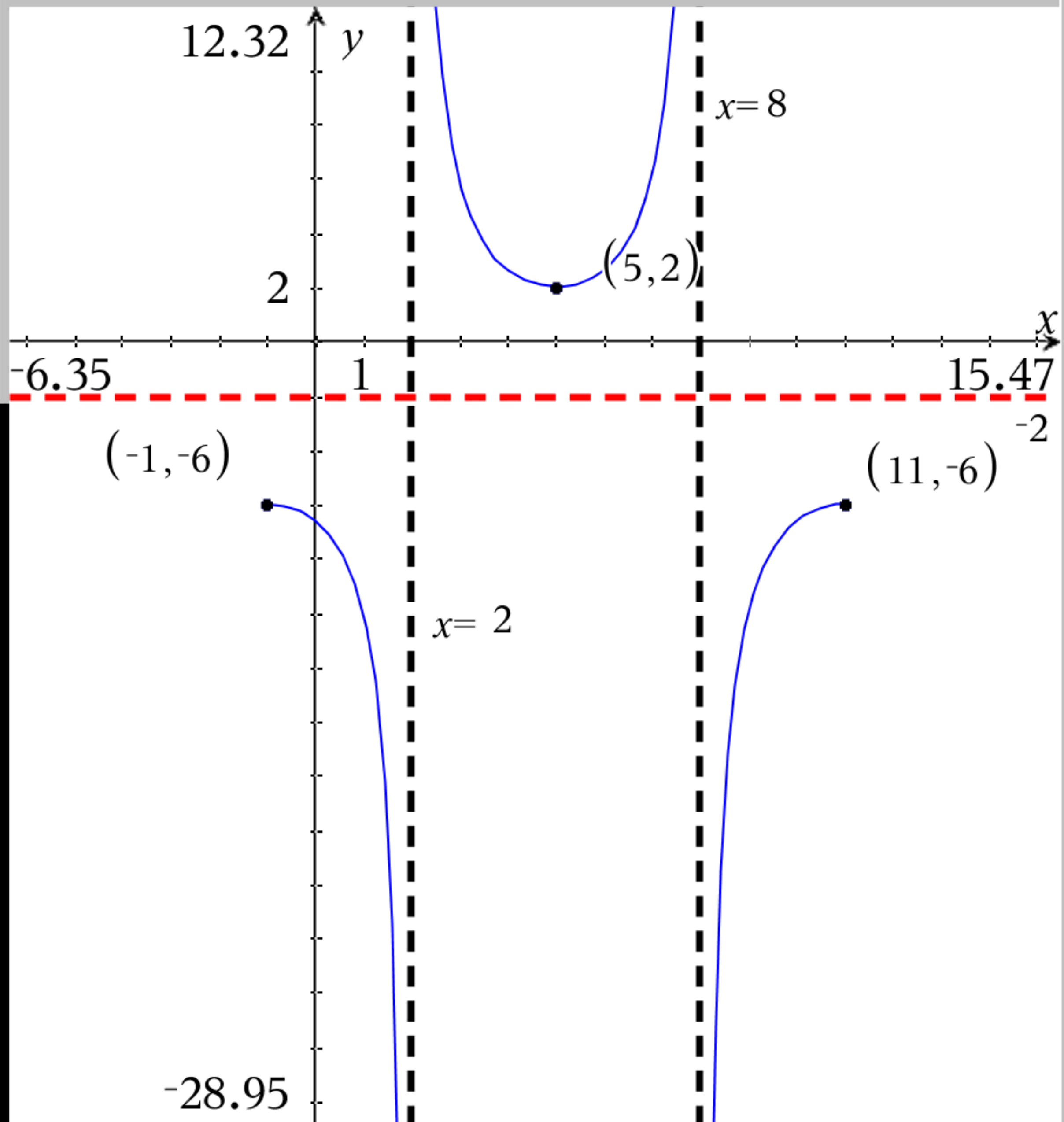
$y = {}^{-}2$

Local Extremes

(-1,-6) (5,2) (11,-6)

Asymptotes

x =2 x =8



Step 1 What are the a, b,c d of the transformation?

a= -4 b= $\frac{\pi}{6}$ c = $\frac{\pi}{6}$ d = -2

Step 2: Factor INTERIOR function

$y=-4\sec\left(\frac{\pi}{6}x + \frac{\pi}{6}\right) - 2$ **NOTE: This asking you to do this** $\frac{\pi}{6} \div \frac{\pi}{6} = \frac{\pi}{6} \cdot \frac{6}{\pi} = 1$

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

Note: Since $\frac{c}{b} = 1$ we know that the horizontal shift is SHIFT LEFT

Note: Since b = $\frac{\pi}{6}$, We know that there is a horizontal stretch

Note: Since we know there is SHIFT LEFT

and we have factored form, A period begins at x = -1

Step 3: Determine the length of period using period $= \frac{2\cdot\pi}{|b|}$

NOTE: This asking you to do this $2\cdot\pi \div \frac{\pi}{6} = 2\cdot\pi \cdot \frac{6}{\pi} = 12$ So we know the period is 12 LONG

$a = {}^{-}4$ $b = \frac{\pi}{6}$ $c = \frac{\pi}{6}$ $d = {}^{-}2$ $y = {}^{-}4\sec\left(\frac{\pi}{6}x + \frac{\pi}{6}\right) - 2$ $y = {}^{-}4\sec\left(\frac{\pi}{6}(x + 1)\right) - 2$

period length is 12 and ONE PERIOD starts at ⁻1

Step 4: Determine the FIVE IMPORTANT x values

start = ⁻1 (this is the first local extreme of secant)

$\text{start} + \frac{1 \cdot \text{period}}{4} = {}^{-}1 + 3 = 2$ (this is where first asymptote occurs)

$\text{start} + \frac{2 \cdot \text{period}}{4} = {}^{-}1 + 6 = 5$ (this is the second local extreme of secant)

$\text{start} + \frac{3 \cdot \text{period}}{4} = {}^{-}1 + 9 = 8$ (this is the second asymptote of secant)

$\text{start} + \text{period} = {}^{-}1 + 12 = 11$ (this is the last local extreme of secant)

$a = {}^-4$ $b = \frac{\pi}{6}$ $c = \frac{\pi}{6}$ $d = {}^-2$ $y = {}^-4\sec\left(\frac{\pi}{6}x + \frac{\pi}{6}\right) - 2$ $y = {}^-4\sec\left(\frac{\pi}{6}(x + 1)\right) - 2$

period length is 12 and ONE PERIOD starts at ⁻1

"cool stuff" happens at x ={⁻1,2,5,8,11}

Step 5: Use d to determine midline $y = {}^-2$

Step 6: Use a and b to determine IF and WHAT KIND of reflections have occurred $a = {}^-4$ $b = \frac{\pi}{6}$

Since a $<$ 0 and b $>$ 0 ,

we know that THERE IS A vertical reflection and THERE IS NO horizontal reflection

Step 7: Find y coordinates of the local extremes using a and d

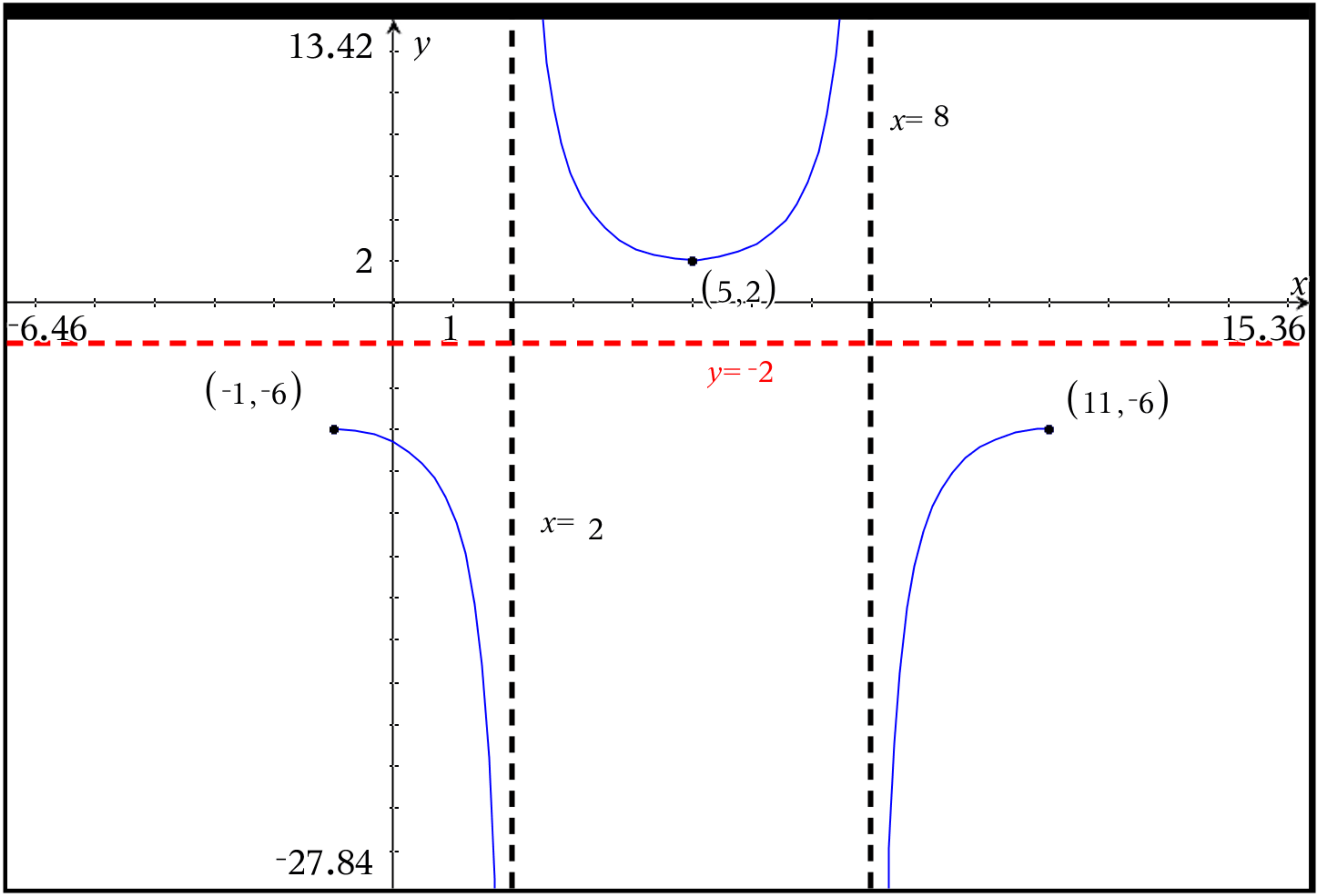
Since a = ⁻4 and d= ⁻2

local extremes (top and bottom of "U" shape) occur at $y = d + |a| = {}^-2 + 4 = 2$ (bottom of a "U")

$y = d - |a| = {}^-2 - 4 = {}^-6$ (top of a "U")

Step 8: Build local extremes

(⁻1,⁻6) and (5,2) and (11,⁻6)


13.42
y
2
x= 8
(5,2)
x
-6.46
1
15.36
y= -2
(-1,-6)
(11,-6)
x= 2
-27.84