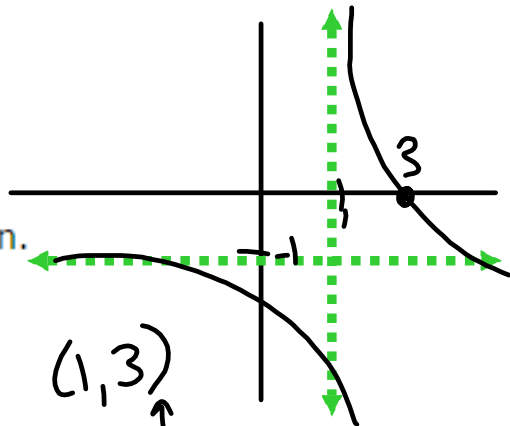


2. Solving a rational inequality: Problem type 1

Solve the following inequality.

$$y = \frac{-x+3}{x-1} > 0$$

Write your answer using interval notation.

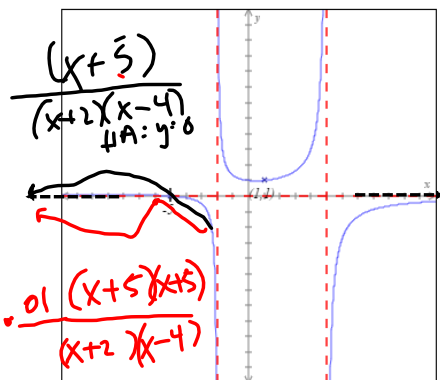


and (1,3)
(No shoe)

4. Writing the equation of a rational function given its graph

The figure below shows the graph of a rational function f with vertical asymptotes $x = -2$, $x = 4$, and horizontal asymptote $y = 0$. The graph also has an x -intercept of -5 , and it passes through the point $(1,1)$.

The equation for $f(x)$ has one of the five forms shown below. Choose the appropriate form for $f(x)$, and then write the equation. You can assume that $f(x)$ is in simplest form.



- $f(x) = \frac{a}{x-b}$ ✓
- $f(x) = \frac{a(x-b)}{x-c}$
- $f(x) = \frac{a}{(x-b)(x-c)}$ ✓
- $f(x) = \frac{a(x-b)}{(x-c)(x-d)}$ ✓
- $f(x) = \frac{a(x-b)(x-c)}{(x-d)(x-e)}$

HA: $b=0$
two VA $x=-2, 4$
one zero $x=-5$

$$y = \frac{a(x+5)}{(x+2)(x-4)}$$

$$1 = \frac{a \cdot b}{3 \cdot (-3)}$$

$$a = \frac{-b}{9}$$

HA=0 says the degree of the denominator is BIGGER

5. Finding the rate or time in a word problem on continuous exponential growth or decay

Suppose that the number of bacteria in a certain population increases according to a *continuous exponential growth model*. A sample of 1300 bacteria selected from this population reached the size of 1419 bacteria in three hours. Find the hourly growth rate parameter.

Note: This is a *continuous* exponential growth model.

Write your answer as a percentage. Do not round any intermediate computations, and round your percentage to the nearest hundredth.

$$P = Q e^{(RT)}$$

$$\frac{1419}{1300} = \frac{1300}{1300} e^{(R \cdot 3)}$$

$$1419/1300 = e^{3R}$$

$$3R = \ln\left(\frac{1419}{1300}\right)$$

mat 0: solver

$$0 = P - Qe^{(RT)}$$

$$P = 1419$$

$$Q = 1300$$

$$R =$$

$$T = 3$$

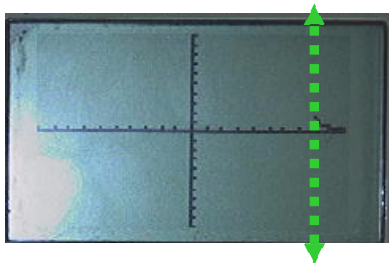
8. Domain of a logarithmic function: Advanced

Find the domain of the function.

$$f(x) = \log\left(\frac{3}{x-8}\right)$$

$$x-8 > 0$$

Write your answer as an interval or union of intervals.



$$(8, \infty)$$

9. Inverse functions: Problem type 2

The one-to-one function h is defined below.

$$h(x) = \frac{5x-4}{2x+3}$$

Find $h^{-1}(x)$, where h^{-1} is the inverse of h .

Also state the domain and range of h^{-1} in interval notation.

Domain

$2x+3 \neq 0$
 $2x \neq -3$
 $x \neq -3/2$

$$y = \frac{5x-4}{2x+3}$$

$$y(2x+3) = 5x-4$$

$$\begin{array}{r} 2xy + 3y = 5x - 4 \\ -2xy \quad +4 \quad -2xy \\ \hline 3y + 4 = 5x - 2xy \end{array}$$

$$3y+4 = 5x-2xy$$

$$3y+4 = x(5-2y)$$

$$\frac{3y+4}{5-2y} = x$$

$$y^{-1} = \frac{3x+4}{5-2x}$$

Domain: $5-2x \neq 0$
 $5 \neq 2x$
 $5/2 \neq x$

Range = Domain:
 $y \neq -3/2$

Domain of h^{-1} : $(-\infty, \frac{5}{2}) \cup (\frac{5}{2}, \infty)$

Range of h^{-1} : $(-\infty, -\frac{3}{2}) \cup (-\frac{3}{2}, \infty)$

9. Inverse functions: Problem type 2

The one-to-one function f is defined below.

$$f(x) = \frac{2x-9}{9x+8}$$

Find $f^{-1}(x)$, where f^{-1} is the inverse of f .

Also state the domain and range of f^{-1} in interval notation.

Domain

$(-\infty, -8/9) \cup (-8/9, \infty)$

$$y(9x+8) = 2x-9$$

$$\begin{array}{r} 9xy + 8y = 2x - 9 \\ -9xy \quad +9 \quad -9xy \\ \hline 8y + 9 = 2x - 9xy \\ 8y + 9 = x(2-9y) \\ \frac{8y+9}{2-9y} = x \end{array}$$

$$\frac{8x+9}{2-9x} = y^{-1}$$

Domain:
 $(-\infty, 2/9) \cup (2/9, \infty)$

Range

$(-\infty, -8/9) \cup (-8/9, \infty)$

10. Arc length and central angle measure

A circle has a radius of 11 in. Find the radian measure of the central angle θ that intercepts an arc of length 20 in.

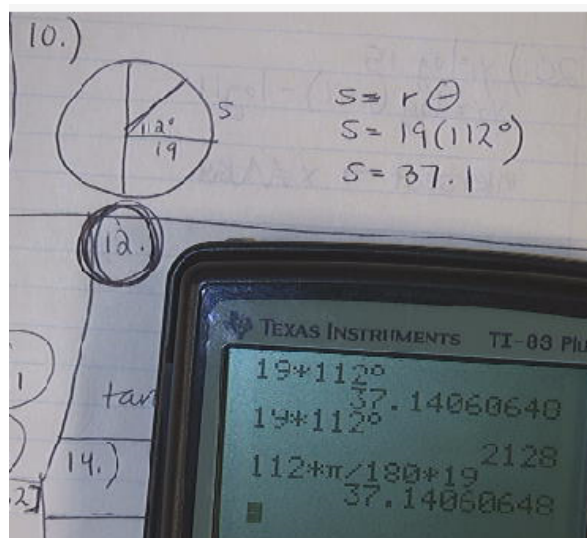
Do not round any intermediate computations, and round your answer to the nearest tenth.

$$r = 11 \quad s = 20$$

$$s = r\theta$$

$$20 = 11\theta$$

$$\frac{20}{11} = \theta$$



11. Finding trigonometric ratios from a point on the unit circle

Suppose that θ is an angle in standard position whose terminal side intersects the unit circle at

$$\left(-\frac{8}{17}, -\frac{15}{17}\right).$$

Find the exact values of $\sin\theta$, $\cot\theta$, and $\csc\theta$.

$$-\frac{15}{17}, \frac{8}{15}, \frac{-17}{15}$$

12. Trigonometric functions and special angles: Problem type 2

Find the exact values below. If applicable, click on "Undefined".

$$\csc \frac{3\pi}{4}$$

$$\cot \frac{3\pi}{4}$$

$$1/\sin(3\pi/4) = 1.414\dots = \sqrt{2}$$

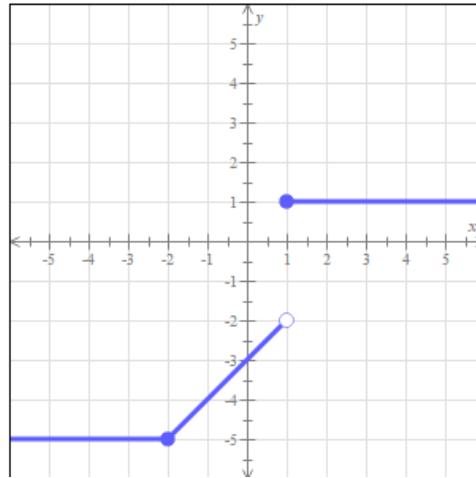
$$1/\tan(3\pi/4) = -1$$

13. Graphing a piecewise-defined function: Problem type 1

Suppose that the function h is defined, for all real numbers, as follows.

$$h(x) = \begin{cases} -5 & \text{if } x < -2 \\ x-3 & \text{if } -2 \leq x < 1 \\ 1 & \text{if } x \geq 1 \end{cases}$$

Graph the function h .

**14. Finding the asymptotes of a rational function: Basic**

Graph all vertical and horizontal asymptotes of the function.

$$f(x) = \frac{1}{-4x+2}$$

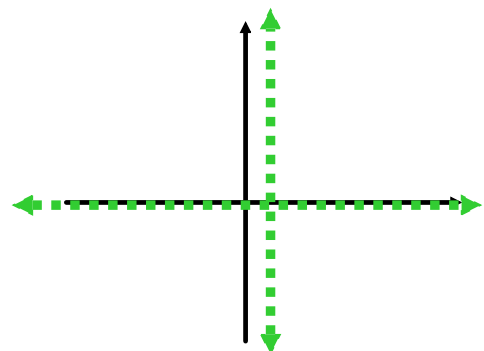
degree num = 0

degree denom = 1

HA = 0

VA is when $-4x+2=0$

VA: $x=1/2$



15. Using a graphing calculator to solve an exponential or logarithmic equation

Use the ALEKS graphing calculator to solve the equation.

$$3 \log(2x + 6) = x + 2$$

Round to the nearest hundredth.

If there is more than one solution, separate them with commas.

intersect method

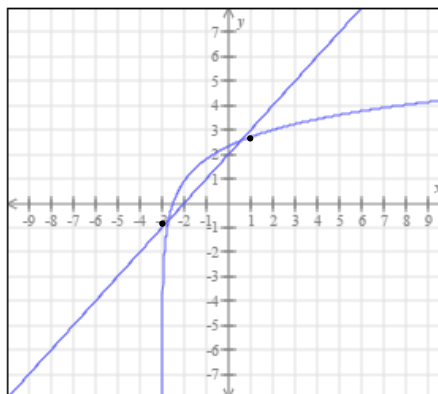
$$y_1 = 3 \log(2x + 6)$$

$$y_2 = x + 2$$

calc:5 intersect

X=.....

you will have to this twice

**16. Finding x- and y-intercepts given a polynomial function**

Find all y-intercepts and x-intercepts of the graph of the function.

$$f(x) = x^3 + 3x^2 - 4x - 12$$

$$\text{yint } f(0) = -12$$

If there is more than one answer, separate them with commas.

Click on "None" if applicable.

$$x^2(x+3) - 4(x+3)$$

$$(x^2 - 4)(x + 3)$$

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

$$-2, 2, -3 \text{ x intercepts}$$

17. Finding a final amount in a word problem on exponential growth or decay

A city has a population of 390,000 people. Suppose that each year the population grows by 4.5%. What will the population be after 11 years?

Use the calculator provided and round your answer to the nearest whole number.

$$P=? \quad 390000e^{(.045*11)}=639794$$

$$Q=390000$$

$$R=0.045$$

$$T= 11$$

17. Finding a final amount in a word problem on exponential growth or decay

An amount of \$28,000 is borrowed for 13 years at 4.75% interest, compounded annually. If the loan is paid in full at the end of that period, how much must be paid back?

Use the calculator provided and round your answer to the nearest dollar.

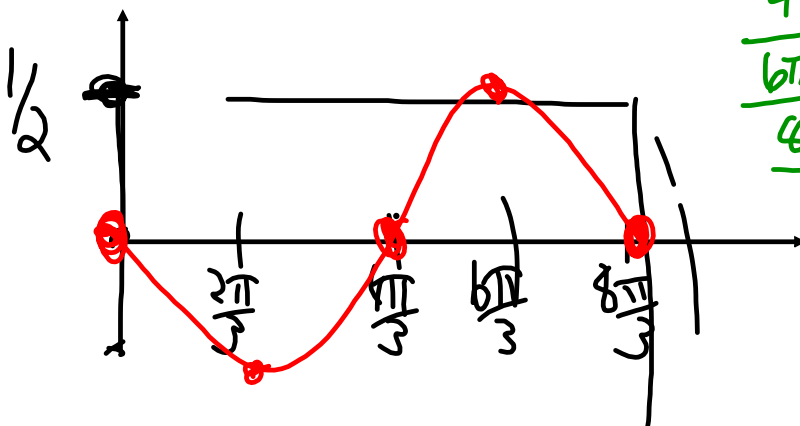
$$\begin{aligned}
 P &= Q \left(1 + \frac{R}{n} \right)^{nt} \\
 &= 28 \left(1 + \frac{0.0475}{1} \right)^{(1)13} \\
 &= 28(1.0475)^{13} = 51...
 \end{aligned}$$

19. Sketching the graph of a sine or cosine function: Problem type 2

Graph the function $y = -\frac{1}{2} \sin\left(\frac{3}{4}x\right)$.

period: $2\pi / (.75) = 8\pi/3$

ampl: $1/2$



0	0
$2\pi/3$	$-1/2$
$4\pi/3$	0
$6\pi/3$	$1/2$
$8\pi/3$	0