

Day 16:REVISED Midterm (2) - Question #9;
Arc length and central angle measure

A circular arc has measure 3 ft and is intercepted by a central angle of 73° . Find the radius r of the circle.

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

$$s = \text{radians} * \text{radius}$$

$$3 = \frac{73 * \pi}{180} r$$

$$r = \frac{3 * 180}{73 \pi}$$

Arc length and central angle measure

A circle has a radius of 10in . Find the length s of the arc intercepted by a central angle of 130° .

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

$$s = \text{radians} * \text{radius}$$

$$s = 130 \pi / 180 * 10$$

$$r = 1300\pi / 180 = 22.69$$

Coterminal angles

Answer the following.

(a) Find an angle between 0 and 2π that is coterminal with $\frac{15\pi}{2}$.

(b) Find an angle between 0° and 360° that is coterminal with -675° .

Give exact values for your answers.

$$\text{b) } -675 + 360 = -315$$

$$-315 + 360 = 45$$

$$\text{a) } 15\pi/2 * 180/\pi = 1350$$

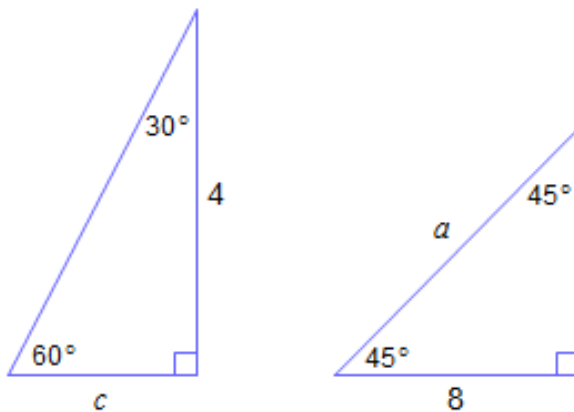
$$1350 - 360 - 360 - 360 = 270$$

$$270 * \pi/180 = 3\pi/2$$

Special right triangles

For the right triangles below, find the exact values of the side lengths c and a .

If necessary, write your responses in simplified radical form.



$$\text{opp}(60) = 4 \quad \text{adj}(60) = x$$

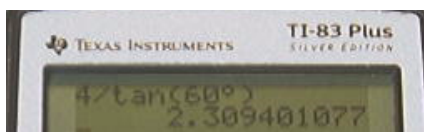
$$\tan(60) = \frac{\text{opp}}{\text{adj}} = \frac{4}{c}$$

$$c = 4 / \tan(60) = 2.3$$

$$\cos(45^\circ) = 8/a$$

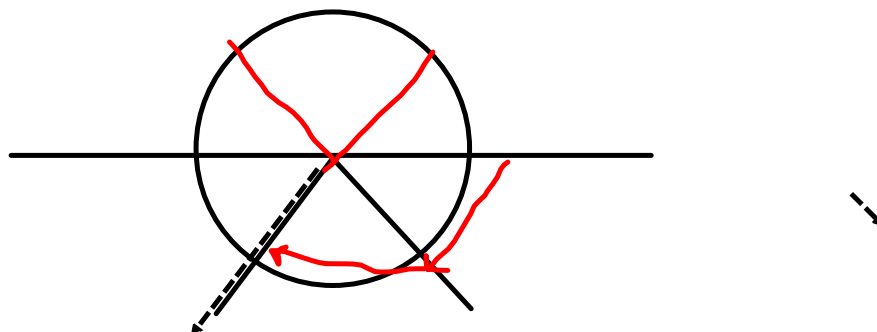
$$a = 8/\cos(45)$$

$$a = 11.3$$



Sketching an angle in standard position

Sketch $\theta = -\frac{2\pi}{3}$ in standard position.



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 $\left(-\frac{2\sqrt{2}}{3}, \frac{1}{3}\right)$.

Find the exact values of $\tan \theta$, $\cos \theta$, and $\csc \theta$.

$$\tan \theta = \frac{y}{x} = \frac{1/3}{(-2\sqrt{2})/3}$$

$$= -\frac{1}{2\sqrt{2}} = -\frac{\sqrt{2}}{4}$$

$$\cos \theta = x = \frac{-2\sqrt{2}}{3}$$

$$\csc \theta = \frac{1}{y} = 3$$

Trigonometric functions and special angles: Problem type 1

Find the exact value of $\cos \frac{7\pi}{4}$.

$$\cos(7\pi/4) = \text{cos}(7\pi/4) \quad .7071067812$$

$$.707\dots = \text{sqr}(2) / 2 = \sqrt{2}/2$$

Trigonometric functions and special angles: Problem type 2

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

$$\csc 360^\circ = 1 / \sin(360) = 1 / 0 \text{ UNDEFINED}$$

$$\cot 360^\circ = 1 / \tan(360) = 1 / (0/1) = 1 / 0$$

undefined

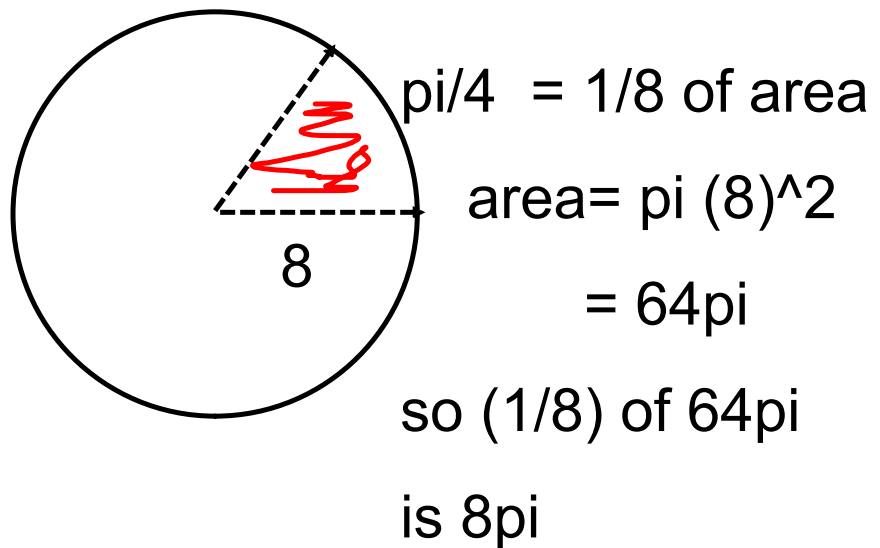
Find the exact values below. If applicable, click on "Undefined."

$$\cos \frac{15\pi}{4} = .707 = \frac{\sqrt{2}}{2}$$

$$\tan(-90^\circ) = \text{undefined}$$

A circle has a radius of 8 yd . A sector of the circle has a central angle of $\frac{\pi}{4}$ radians. Find the area of the sector.

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



**Day 15 - Question #10;
Angular and linear speed**

A cyclist is riding a bicycle whose wheels have a radius of 14 inches. Suppose the wheels turn at a rate of 290 revolutions per minute.

- (a) Find the angular speed of the wheels in radians per minute.
(b) Find the speed of the cyclist in miles per hour. (Use the fact that 1 mi = 5280 ft .)

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

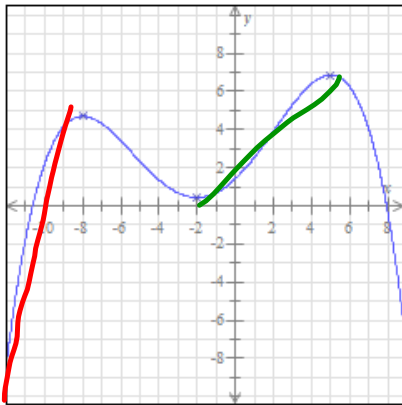
radians per min means radian / min

$r = 14\text{in}$ 290 revolutions per min

290 revolutions * perimeter

$290 * 2 \pi r = 290 * 2 * \pi * 14 = 8120\pi \text{ ra/min}$

25509.7 radians per min



(a) The function f is increasing over which intervals? Choose all that apply.

- $(-\infty, -8)$
 $(-8, -2)$
 $(-2, 5)$
 $(-8, 5)$
 $(5, \infty)$

(b) The function f has local maxima at which x -values? If there is more than one value, separate them with commas.

-8,5

(c) What is the sign of the leading coefficient of f ?

Select One

neg

sad parabola

(d) Which of the following is a possibility for the degree of f ? Choose all that apply.

- 4
 5
 6
 7
 8
 9

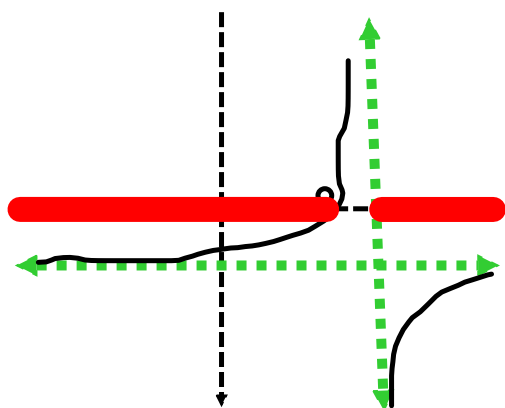
2. Solving a rational inequality: Problem type 1

Solve the following inequality.

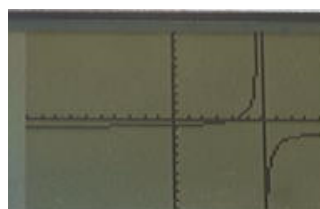
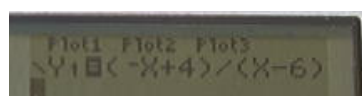
$$\frac{-x+4}{x-6} < 0$$

Write your answer using interval notation.

$$y = \frac{-x+4}{x-6}$$



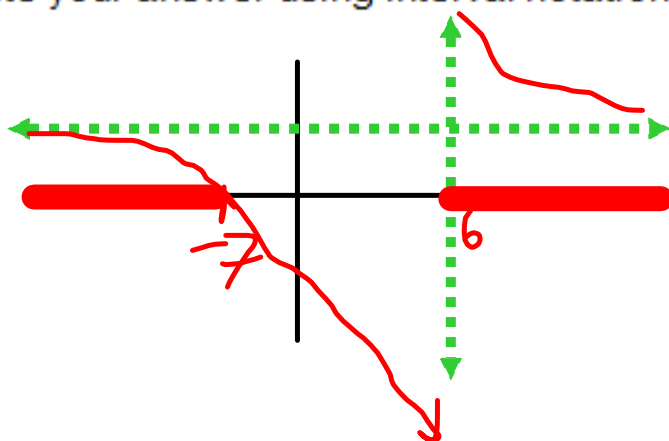
$$(-\infty, 4) \cup (6, \infty)$$



Solve the following inequality.

$$\frac{x+7}{x-6} \geq 0$$

Write your answer using interval notation.



$$(-\infty, -7] \cup (6, \infty)$$

4. Solving a multi-step equation involving natural logarithms

Solve for x .

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

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

$$\ln(x+2) = 2$$

$$e^2 = x + 2 \text{ by definition p1}$$

$$x = e^2 - 2$$

use intersection method

use solver

Plot1 Plot2 Plot3
Y1 = $\log((X+1)/10)$
9(3)
Y2 =

X	Y1
0	0
1	.63093
1.2619	1.2619
1.465	1.465
1.6309	1.6309
1.7712	1.7712

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

$$f(x) = \sqrt{x+8} + 1 \quad \text{range: } [1, \infty)$$

Find f^{-1} , the inverse of f . Then give the domain of f^{-1} using interval notation.

$$y = \text{sqr}(x+8)+1$$

$$y-1 = \text{sqr}(x+8)$$

$$(y-1)^2 = x+8$$

$$(y-1)^2 - 8 = x$$

$$y = (x-1)^2 - 8$$

$$\text{domain: } [1, \infty)$$

Suppose that the number of bacteria in a certain population increases according to a *continuous exponential growth model*. A sample of 1400 bacteria selected from this population reached the size of 1562 bacteria in two and a half 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.

$$P = Q e^{(R T)}$$

$$P=1562$$

$$Q=1400$$

$$R=?$$

$$T=2.5$$

Suppose that \$2000 is invested at a rate of 5.5% , compounded semiannually. Assuming that no withdrawals are made, find the total amount after 7 years.

$$P = Q (1 + R/N) ^ (NT)$$

$$P=?$$

$$Q= 2000$$

$$R=.055$$

$$N=2$$

$$T=7$$

