MATH 1060Q Precalculus: Exam II Review Session

MATH 1060Q

Scan the QR code to access the review slides.

Agenda

01

Introduction

Who am I? What's on the exam?

02

Review

Work through ten practice problems together.

03

Questions

Are there any other topics you would like to discuss?

04

Note Sheet

Definitions, formulas, and topics to include on your note sheet.

MATH 1060Q Exam 2

Topics

Section 3.1	One-to-one property, graphs of exponential functions
Section 3.2	Evaluating logarithms, graphs of logarithmic functions, inverse property of logarithms
Section 3.3	Change of base formula, expanding/condensing logarithmic expressions using properties of logarithms
Section 3.4	Solving exponential and logarithmic equations
Section 3.5	Compound interest, radioactive decay, writing a formula given points
Section 4.1	Sketching angles, coterminal angles, complementary and supplementary angles, converting between degrees and radians, finding arc length
Section 4.2	Evaluating trigonometric functions

For more info:
SUGGESTED PRACTICE PROBLEMS

Q Center resources:
REVIEW SESSION MATERIALS

Question 1

a) Use the one-to-one property to solve the equation for x.

$$\left(\frac{1}{2}\right)^x = 32$$

b) Describe the transformation(s) of the graph of f that yield(s) the graph of g.

$$f(x) = 10^x, \quad g(x) = 10^{-x+3}$$

Question 2

Evaluate the logarithm at the given values of x without using a calculator.

$f(x) = \log_8 x \qquad x = 1$

$g(x) = \log_a x \qquad x = a^{-2}$

Question 3

Find the domain, x-intercept, and vertical asymptote of the logarithmic function and sketch its graph.

$$f(x) = -\log_6(x + 2)$$

Question 4

a) Use the properties of logarithms to expand the expression.

$$\log_5 \frac{x^2}{y^2 z^3}$$

b) Use the properties of logarithms to condense the expression.

$$\tfrac{1}{3}[\log_8 y + 2\log_8(y+4)] - \log_8(y-1)$$

Question 5

a) Solve the exponential equation algebraically.

$$6(2^{3x-1}) - 7 = 9$$

b) Solve the logarithmic equation algebraically.

$$\ln(x + 5) = \ln(x - 1) - \ln(x + 1)$$

Question 6

a) Find the missing values assuming continuously compounded interest.

Initial Investment	Annual % Rate	Time to Double	Amount After 10 Years
	4.5%		$10,000.00

b) Find the missing values for the radioactive isotope.

Isotope	Half-life (years)	Initial Quantity	Amount After 1000 Years
^{14}C	5715		2 g

Question 7

Find (if possible) the complement and supplement of each angle.

(a) $\frac{\pi}{12}$ (b) $\frac{11\pi}{12}$

Question 8

Convert each degree measure to radian measure as a multiple of π. Do not use a calculator.

(a) $120°$ (b) $-20°$

Question 9

Find the length of the arc on a circle of radius r intercepted by a central angle θ.

$r = 15$ inches, $\theta = 120°$

Question 10

a) Evaluate (if possible) the six trigonometric functions at the real number.

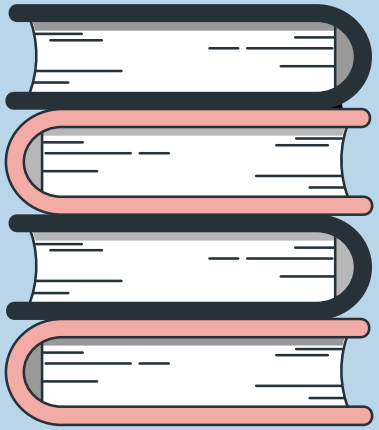
$$t = -5\pi/3$$

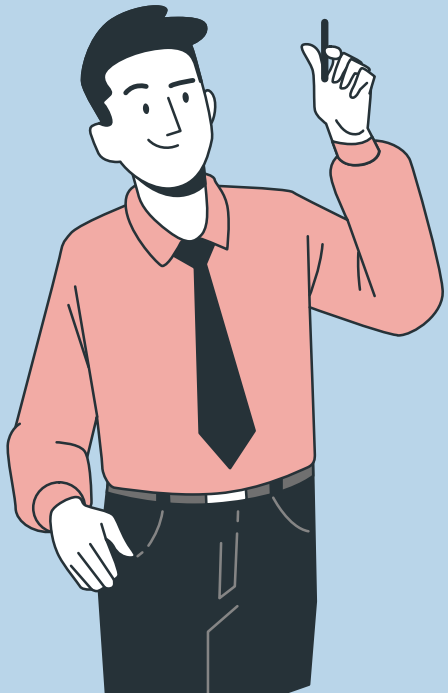
b) Evaluate the trigonometric function using its period as an aid.

$$\cos(7\pi/3)$$

Questions?

Is there a topic you would like to discuss more?
Do you want to review a problem again?
Are there any ideas that are confusing?

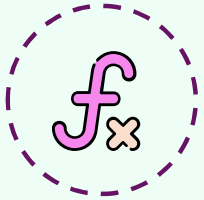




Note Sheet

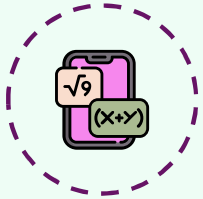
Hello! If you are looking for information to write on your note sheet, here are a few topics that might be worth including.

One-to-One Property



Definition

For a > 0 and a ≠ 1, $a^x = a\text{^}y$ if and only if x = y.



Example

$9 = 3^{x+1}$	*original equation*
$3^2 = 3^{x+1}$	$9 = 3^2$
$2 = x + 1$	*one-to-one property*
$1 = x$	*solve for x*

Transformations

Horizontal Shifts

Left: $f(x) = a^{x+h}$

Right: $f(x) = a^{x-h}$

Vertical Shifts

Up: $f(x) = a^x + k$

Down: $f(x) = a^x - k$

Reflection over x-axis

$f(x) = -a^x$

Reflection over y-axis

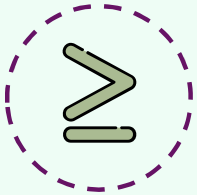
$f(x) = a^{-x}$

Logarithms

For x > 0, a > 0, and a ≠ 1, $y = \log_a x$ if and only if $x = a^y$.

Property	Logarithm with Base a	Natural Logarithm
Product	$\log_a uv = \log_a u + \log_a v$	$\ln uv = \ln u + \ln v$
Quotient	$\log_a \frac{u}{v} = \log_a u - \log_a v$	$\ln \frac{u}{v} = \ln u - \ln v$
Power	$\log_a u^n = n \log_a u$	$\ln u^n = n \ln u$

Exponential and Logarithmic Models



Exponential Growth

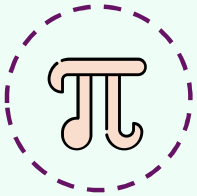
$y = ae^{bx}, \quad b > 0$

Exponential Decay

$y = ae^{-bx}, \quad b > 0$

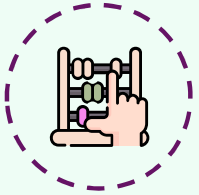
Gaussian

$y = ae^{-(x-b)^2/c}$



Logistic Growth

$$y = \frac{a}{1 + be^{-rx}}$$



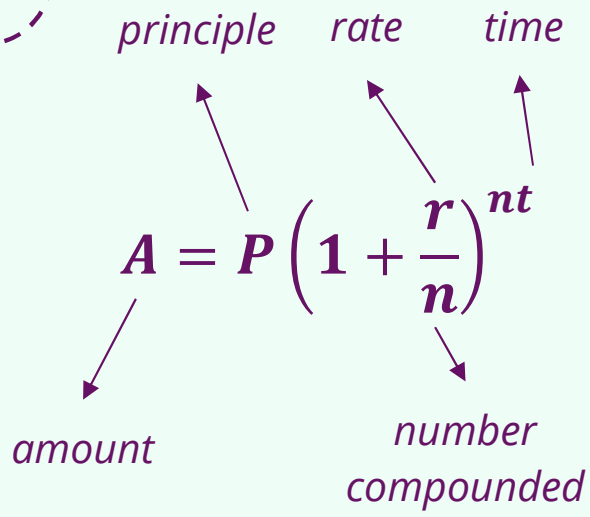
Logarithmic

$y = a + b\ln x, \quad y = a + b\log x$

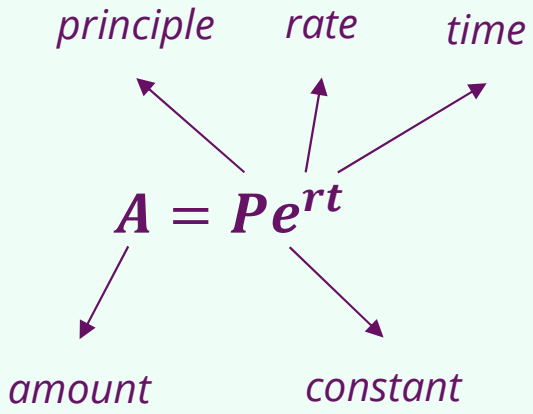
Interest

1. Compound
2. Continuous

1



2



Angles

Vertex

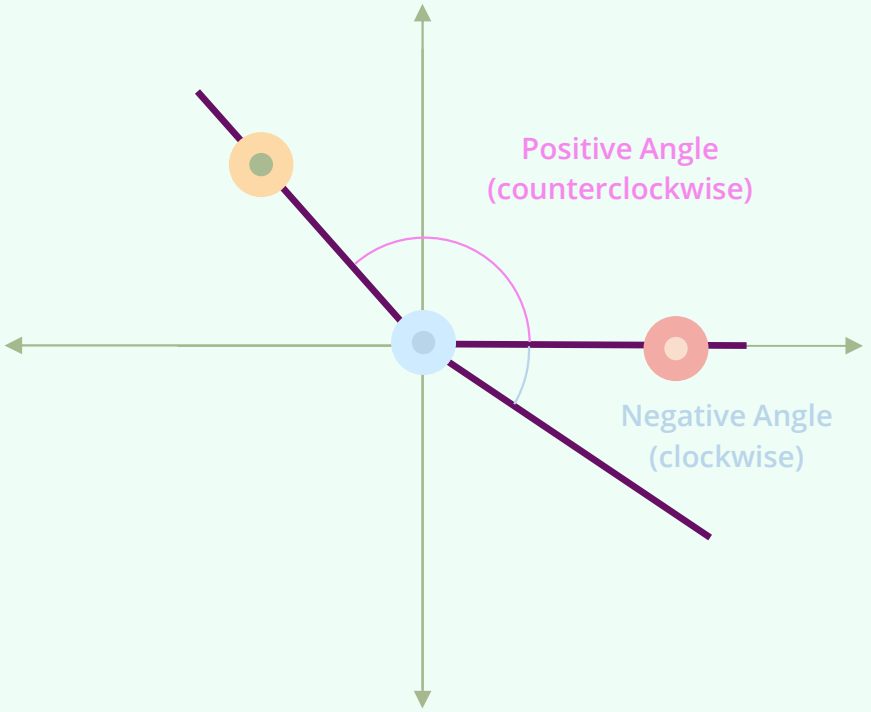
A point where two straight lines or rays meet.

Terminal Side

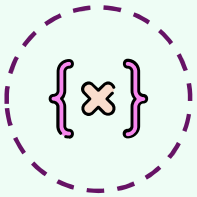
The side of the angle that results after the rotation from its initial position.

Initial Side

The side lying on the positive x-axis.



Radian and Degree Measure



Radian

One radian (rad) is the measure of a central angle θ that intercepts an arc s equal in length to the radius r of the circle. Algebraically, this means that

$$\theta = \frac{s}{r}$$

where θ is measured in radians.

Degree

Another way to measure angles is in degree, denoted by the symbol $^\circ$. A measure of one degree (1°) is equivalent to a rotation of 1/360 of a complete revolution about the vertex.

$360° = 2\pi$ rad and $180° = \pi$ rad

$1° = \frac{\pi}{180}$ rad and 1 rad $= (\frac{180}{\pi})°$

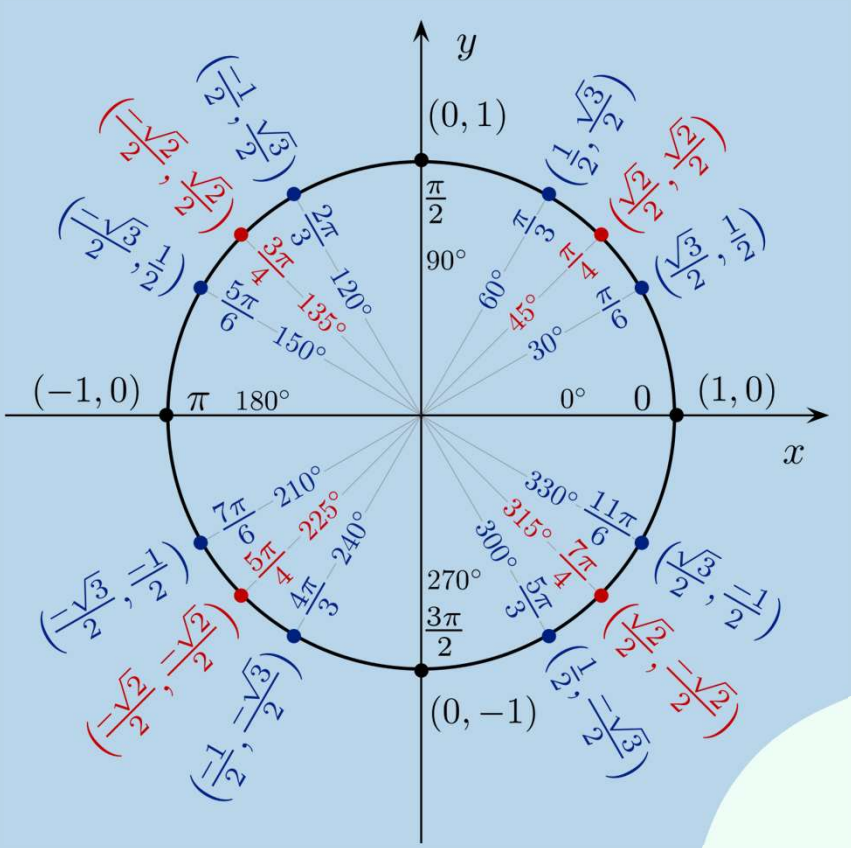
Radians to Degrees	multiply radian by 180° / π rad
Degrees to Radians	multiply degree by π rad / 180°

Definition of Trigonometric Functions

Let t be a real number and let (x, y) be the point on the unit circle corresponding to t.

$\sin t = y$	$\cos t = x$	$\tan t = \frac{y}{x}$
$\csc t = \frac{1}{y}, \quad y \neq 0$	$\sec t = \frac{1}{x}, \quad x \neq 0$	$\cot t = \frac{x}{y}, \quad y \neq 0$

Unit Circle


y
x
(0, 1)
(1, 0)
(−1, 0)
(0, −1)
π/2
90°
π/3
60°
π/4
45°
π/6
30°
0°
0
π
180°
2π/3
120°
3π/4
135°
5π/6
150°
7π/6
210°
5π/4
225°
4π/3
240°
3π/2
270°
5π/3
300°
7π/4
315°
11π/6
330°
(1/2, √3/2)
(√2/2, √2/2)
(√3/2, 1/2)
(−1/2, √3/2)
(−√2/2, √2/2)
(−√3/2, 1/2)
(−√3/2, −1/2)
(−√2/2, −√2/2)
(−1/2, −√3/2)
(1/2, −√3/2)
(√2/2, −√2/2)
(√3/2, −1/2)

Definition of Periodic

A function *f* is periodic when there exists a positive real number *c* such that

$$f(t + c) = f(t)$$

For all *t* in the domain of *f*. The smallest number *c* for which *f* is periodic is the period of *f*.

Even and Odd Trigonometric Functions

The cosine and secant functions are *even*.

The sine, cosecant, tangent, and cotangent functions are *odd.*

$$\cos -t = \cos t$$

$$\sin -t = -\sin t$$

$$\csc -t = -\csc t$$

$$\sec -t = \sec t$$

$$\tan -t = -\tan t$$

$$\cot -t = -\cot t$$

Thanks!

Do you have any questions?

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