

## CALCULUS AB SUMMER HOMEWORK

The following pages contain a sampling of problems that are foundational to understanding Calculus.

In addition to solving the problems, I would like you to explain your understanding of the problem. This does not mean describing the steps you took, but rather justifying those steps and explaining how you knew to perform them steps. The format for explaining this is free form, in particular it does not need to be paragraph explanations, but in any case it should be clear and comprehensible.

# TRIGONOMETRY

Evaluate:

$$\sin -\frac{13\pi}{6} =$$

$$\cos \frac{11\pi}{4} =$$

$$\sec \frac{8\pi}{3} =$$

$$\cot -\frac{-17\pi}{6} =$$

$$\tan \frac{-5\pi}{4} =$$

$$\csc \frac{111\pi}{3} =$$

$$\sin -\frac{5\pi}{2} =$$

$$\sec 7\pi =$$

$$\tan 4\pi =$$

Simplify to a single term with no fractions:

$$\frac{(\sin x)(\csc x)}{\cot^2 x} - 1 =$$

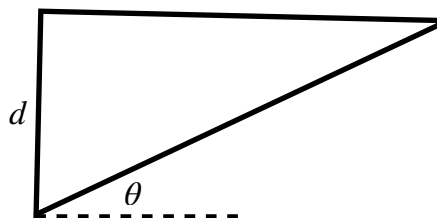
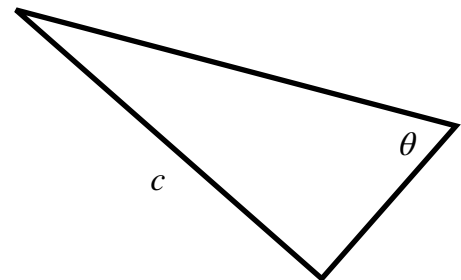
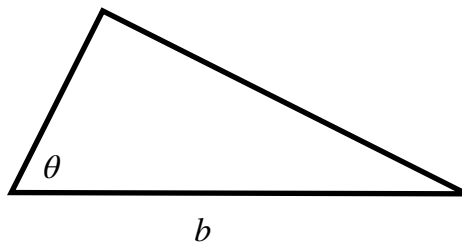
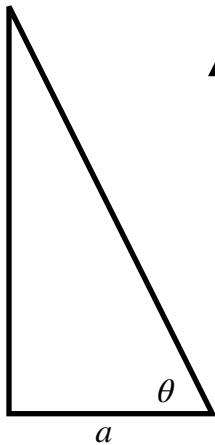
$$\frac{1}{\cos^2 x} + \frac{1}{\sin^2 x} =$$

$$\frac{\sec x}{\sec^2 x + \csc^2 x} =$$

$$\tan x + \cot x =$$

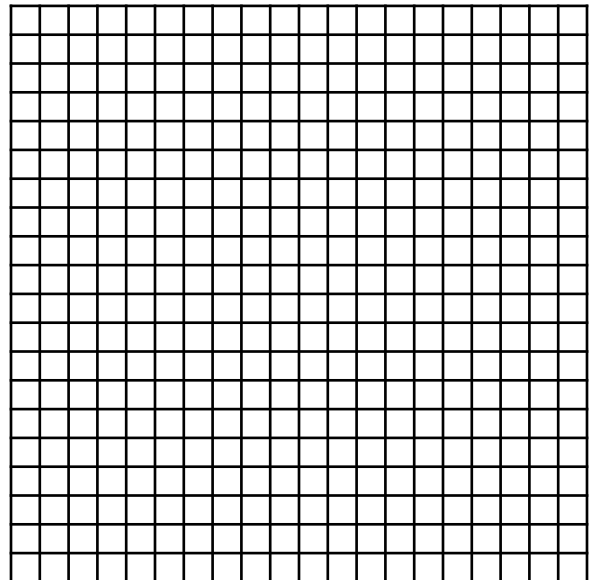
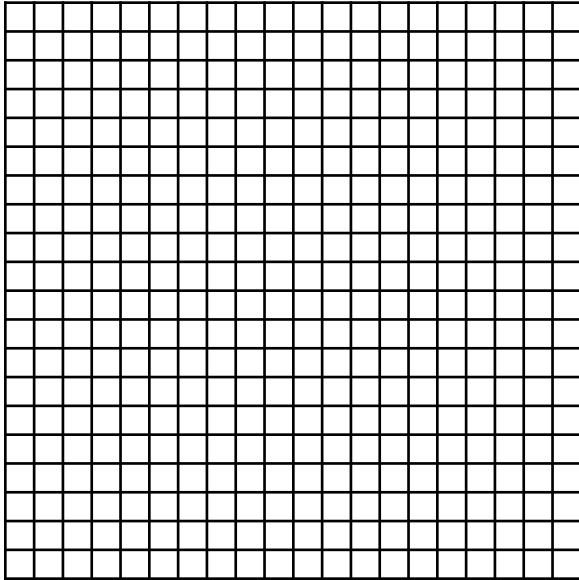
Explain the angle sum formula for sin and cos.

Write expressions for then length of the unlabeled sides:



## EXPONENTS AND LOGS

Sketch  $y = 2^{-x}$  and  $y = \log_2 x$



Condense:

$$3 \ln x - 4 \ln y =$$

$$\ln x + \frac{\ln y}{2} =$$

$$\frac{1}{2} \ln 25 - 2 \ln 3 =$$

Expand:

$$\ln \sqrt{\frac{a}{b^3}}$$

$$\ln (c^3 + d^2)$$

$$(\ln x) + c$$

Write an expression equivalent to  $7^x$  with a base of  $e$

Write an expression equivalent to  $\log_5 y$  in terms of  $\ln$

Explain the change of base formula.

## RATIONAL FUNCTIONS, HOLES AND ASYMPTOTES

Each of the functions below has at least one undefined value. Determine whether the undefined value is a hole, a vertical asymptote, or something else. If the undefined value is a hole, find a new function that is equivalent to the given function with the hole removed.

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

$$y = \frac{x^6 - 1}{x^4 - 1}$$

$$y = \frac{x^2 - 5x + 6}{x^2 + 3x - 10}$$

$$y = \frac{\sqrt{x} - 2}{x - 4}$$

$$y = \frac{x^5 + 4x^4 - 3x^3 - 17x^2 - x + 10}{x + 2}$$

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

$$y = \frac{|x| + x}{2x}$$