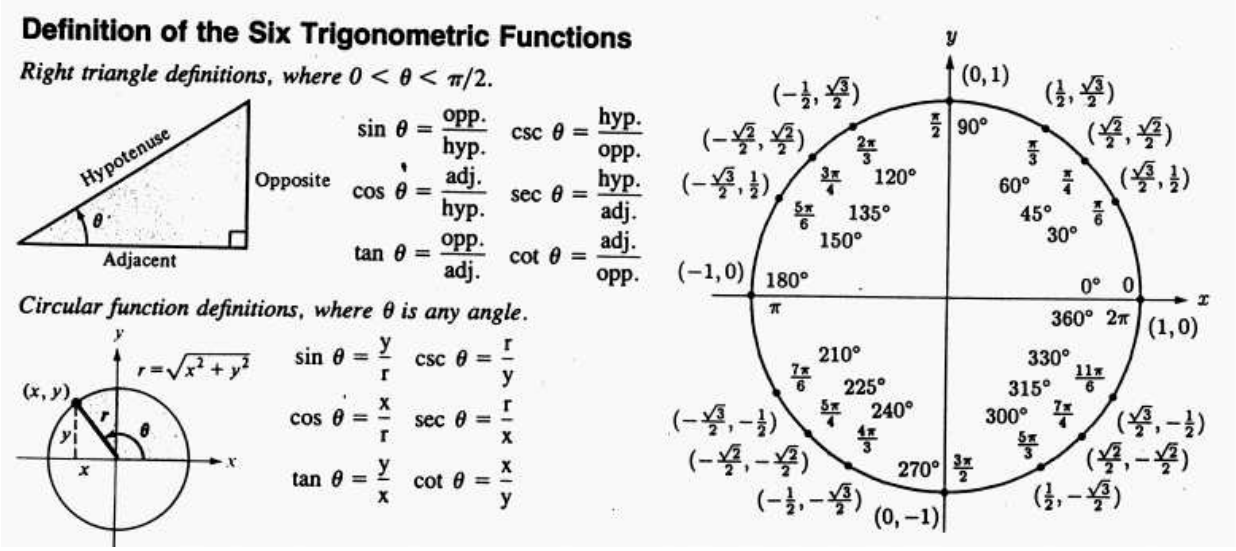
Study Guide for the Math 1650 Gateway Test

(Revised Fall 2021)

Things you should memorize before taking the Gateway test

The unit circle. Memorize the following:



Know how to answer questions like: what is $\tan(5\pi/6)$? and what is $\cos^{-1}(\frac{1}{2})$?

Trigonometric identities. Memorize the following trigonometric identities:

Pythagorean Identity:	$\sin^2\theta + \cos^2\theta = 1$	
Even/Odd Identities:	$\sin(-\theta) = -\sin(\theta)$	$\cos(-\theta) = \cos(\theta)$
Supplementary Angle Identities:	$\sin(\pi - \theta) = \sin(\theta)$	$\cos(\pi - \theta) = -\cos(\theta)$
Complementary Angle Identities:	$\sin(\frac{\pi}{2} - \theta) = \cos(\theta)$	$\cos(\frac{\pi}{2} - \theta) = \sin(\theta)$
Sum and Difference Formulas:	$\sin(A \pm B) = \sin(A)\cos(B) \pm \sin(B)\cos(A)$	
	$\cos(A \pm B) = \cos(A)\cos(B) \mp \sin(A)\sin(B)$	

It would also be helpful to memorize the following identities, but you can survive without them if you know the sum and difference formulas:

Double Angle Formulas:	$\sin(2\theta) = 2\sin(\theta)\cos(\theta)$	$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta)$
Complementary Angles:	$\sin^{-1}(x) + \cos^{-1}(x) = \frac{\pi}{2}$	

Logarithm Rules.

$$\log_a(xy) = \log_a x + \log_a y \qquad a^{\log_a x} = x$$
$$\log_a(\tfrac{x}{y}) = \log_a x - \log_a y \qquad \log_a a^x = x$$
$$\log_a(x^r) = r\log_a x \qquad \log_b x = \frac{\log_a x}{\log_a b}$$

Domain and Range. You should know the domain and range of the following functions, and know what their graphs look like: x^2, $\sqrt{x}$, $\ln x$, a^x, $\sin x$, $\cos x$, $\tan x$, $\sin^{-1} x$, $\cos^{-1} x$, and $\tan^{-1} x$.

ONLINE PRACTICE TESTS: If you have access to the web, you may take "practice tests" online at `http://wcherry.math.unt.edu/math1650/gw.html`

Where to find practice problems

The following table tells you where you can find reading/practice problems if you are having trouble with some of the sample test questions. The first column refers to the problem number on the sample test.

Prob. #	Question	Reading/Study	Practice Problems
1	$\tan(2\pi/3) =?$	Memorize the unit circle on front of this hand-out and study sections 5.1, 5.2 and 5.5	§5.2: 3–22 =S5.5: 3–10
2	$t^2 = \ln(1+x) - \ln(1-x), x =?$	Study section 4.5	§4.5: 3–68
3	Solve $\sin^2 x + 2\sin x = 5/4$	Study section 7.4	§7.4: 5–56
4	$f(x) = \sqrt{4x^2+8}, x \geq 0$ find f^{-1}	Study section 2.8, especially examples 8 & 9. You may also need to study sections 4.3 and 5.5	page §2.8: 49–70 §4.3: 93–94
5	$\sin(2\cos^{-1} x) =?$	Memorize the trigonometric identities on the front of this page and study examples 7 and 8 in section 7.3.	§7.3: 43–54
6	$f(x) = \frac{1+\sin x}{2-\sin x}, -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$, what is $f^{-1}(x)$?	Study sections 1.4, 2.8, and 5.5.	§2.8: 49–70
7	$\frac{\frac{4a}{b}}{\frac{2}{b}+\frac{1}{2}}$	Study section 1.4	problems in §1.4, especially 59–78.
8	$\sqrt{12}\sqrt{\frac{y}{4}}$	Study section 1.2	§1.2: 61–78
9	domain of $2 - \ln(x^2 - 9)$	Study section 2.1 and know the domain and ranges of the functions listed on the previous page	§2.1: 51–72
10	$\frac{x^2-2x-24}{x^2-11x+30}$	Study sections 1.3 and 1.4	Any problems from sections 1.3 and 1.4
11	slope of $4 = -2x + 3y$	Study section 1.10	§1.10: 9–50
12	word problem	Section 1.7	Any word problem in section 1.7