Review for Exam 3
MATH 1112 sections 52 Spring 2020

Sections Covered In Miller: 5.5, 5.6, 5.7, 6.1, 6.2 (plus equations of lines; this covers homeworks 8, 9, and 10)

Calculator Policy: Calculator use won't be allowed on this exam. There won't be tedious calculations, but may be some basic arithmetic.

This review is provided as a courtesy to give some idea of what material is covered. Nothing else is intended or implied.

Potentially useful formulas: (these will be provided)

$$\sin(u \pm v) = \sin u \cos v \pm \sin v \cos u$$

$$\cos(u \pm v) = \cos u \cos v \mp \sin u \sin v$$

$$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u \tan v}$$

1. Fill in the missing values in the table of trigonometric values for select angles. You may wish to do this from memory or by making use of convenient right triangles.

$\theta°$	$0°$	$30°$	$45°$	$60°$	$90°$
θ radians	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	undef.

Note that numbers can be written in alternative, equivalent ways. For example, $\frac{1}{\sqrt{2}}$ and $\frac{\sqrt{2}}{2}$ are the same.

2. Evaluate each trigonometric expression exactly if it exists. (Check with a calculator, but be able to do this without one. You can be sure I will ask you to do so on an exam.)

(a) $\cos\left(\frac{3\pi}{2}\right) = 0$

(b) $\cot(2\pi)$ undefined

(c) $\csc\left(\frac{5\pi}{6}\right) = 2$

(d) $\sin\left(\frac{11\pi}{6}\right) = -\frac{1}{2}$

(e) $\tan\left(\frac{3\pi}{4}\right) = -1$

(f) $\cos\left(\frac{5\pi}{4}\right) = -\frac{1}{\sqrt{2}}$

(g) $\sec\left(\frac{5\pi}{2}\right)$ undefined

(h) $\sec\left(\frac{2\pi}{3}\right) = -2$

(i) $\tan\left(\frac{5\pi}{3}\right) = -\sqrt{3}$

3. Find the remaining trigonometric values of the angle described.

(a) $\tan\theta = \frac{7}{6}$, with terminal side in quadrant 3

$\sin\theta = -\frac{7}{\sqrt{85}}$, $\cos\theta = -\frac{6}{\sqrt{85}}$, $\cot\theta = \frac{6}{7}$, $\csc\theta = -\frac{\sqrt{85}}{7}$, $\sec\theta = -\frac{\sqrt{85}}{6}$

(b) $\sin x = -\frac{4}{5}$, with terminal side in quadrant 4

$\tan x = -\frac{4}{3}$, $\cos\theta = \frac{3}{5}$, $\cot\theta = -\frac{3}{4}$, $\csc\theta = -\frac{5}{4}$, $\sec\theta = \frac{5}{3}$

(c) $\sec\phi = -6$ wiih terminal side in quadrant 2

$\cos\phi = -\frac{1}{6}$, $\sin\phi = \frac{\sqrt{35}}{6}$, $\tan\phi = -\sqrt{35}$, $\cot\phi = -\frac{1}{\sqrt{35}}$, $\csc\phi = \frac{6}{\sqrt{35}}$

4. Evaluate each expression exactly.

(a) $\sin(70°)\cos(25°) - \sin(25°)\cos(70°) \quad = \sin(45°) = \frac{1}{\sqrt{2}}$

(b) $\cos(27°)\cos(3°) - \sin(27°)\sin(3°) \quad = \cos(30°) = \frac{\sqrt{3}}{2}$

(c) $\frac{\tan\left(\frac{5\pi}{36}\right) + \tan\left(\frac{\pi}{9}\right)}{1 - \tan\left(\frac{5\pi}{36}\right)\tan\left(\frac{\pi}{9}\right)} \quad = \tan\frac{\pi}{4} = 1$

5. State the domain and range of each of the six trigonometric functions. Use interval notation or set builder notation.

Function	Domain	Range
$y = \sin x$	$(-\infty, \infty)$	$[-1, 1]$
$y = \cos x$	$(-\infty, \infty)$	$[-1, 1]$
$y = \tan x$	$\left\{x \,:\, x \neq \frac{\pi}{2} + k\pi, \text{ for integer } k\right\}$	$(-\infty, \infty)$
$y = \csc x$	$\{x \,:\, x \neq k\pi \text{ for integer } k\}$	$(-\infty, -1] \cup [1, \infty)$
$y = \sec x$	$\left\{x \,:\, x \neq \frac{\pi}{2} + k\pi, \text{for integer } k\right\}$	$(-\infty, -1] \cup [1, \infty)$
$y = \cot x$	$\{x \,:\, x \neq k\pi \text{ for integer } k\}$	$(-\infty, \infty)$

Another way of saying

$$x \neq \frac{\pi}{2} + k\pi, \text{ for integer } k \quad \text{is to say} \quad x \neq \frac{k\pi}{2}, \text{ for odd integer } k.$$

6. State the domain and the range of each of $f(x) = \sin^{-1}(x)$, $g(x) = \cos^{-1}(x)$ and $H(x) = \tan^{-1}(x)$ using interval notation.

Function	Domain	Range
$y = \sin^{-1} x$	$[-1, 1]$	$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
$y = \cos^{-1} x$	$[-1, 1]$	$[0, \pi]$
$y = \tan^{-1} x$	$(-\infty, \infty)$	$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$