Math 141 Name: _____

MIDTERM 3 – PART 1

(CHAPTER 4)
INTRODUCTION TO TRIGONOMETRY; MATH 141 – SPRING 2019 – KUNIYUKI
150 POINTS TOTAL: 30 FOR PART 1, AND 120 FOR PART 2

Show all work, simplify as appropriate, and use "good form and procedure" (as in class).
Box in your final answers!
No notes or books allowed.

PART 1: USING SCIENTIFIC CALCULATORS (30 PTS.)

If you round off at intermediate steps, round off to at least five significant digits. Write units where appropriate in your final answers.

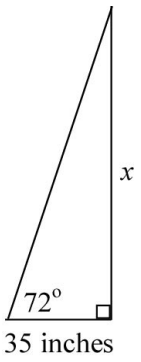
1) A central angle of a circle has measure 2.5 radians. It intercepts an arc of length 9 inches along the circle. What is the radius of the circle? (4 points)

2) Give the solutions for $\sin(\theta) = -0.25$, where $0 \le \theta < 2\pi$. Give your answers in **radians** and in solution set form, and round them off to the nearest thousandth of a radian (that is, to three decimal places). (6 points)

3) Write $\csc\left(\tan^{-1}\left(\frac{x}{5}\right)\right)$, also written as $\csc\left(\arctan\left(\frac{x}{5}\right)\right)$, as an equivalent algebraic expression, as in class. Assume x is in the domain of the expression. (7 points)

4) A very short desert nomad (person) is flying a kite on a straight wire of length 58 feet. (Ignore the height of the nomad.) At a particular time, the angle of elevation from the nomad to the kite is 36°. What is the height of the kite from the ground at that time? Round off your answer to the nearest tenth of a foot. (8 points)

5) Find the length of the side labeled x. Round off your answer to the nearest hundredth of an inch (that is, to two decimal places). (5 points)



Math 141 Name: _____

MIDTERM 3 – PART 2

(CHAPTER 4)
INTRODUCTION TO TRIGONOMETRY; MATH 141 – SPRING 2019 – KUNIYUKI
150 POINTS TOTAL: 30 FOR PART 1, AND 120 FOR PART 2

Show all work, simplify as appropriate, and use "good form and procedure" (as in class).
Box in your final answers!
No notes or books allowed.

PART 2: NO CALCULATORS ALLOWED! (120 POINTS)

If you are asked to evaluate an expression that is undefined, write "und."

6) Fill out the table below. Rationalize denominators and simplify wherever appropriate. You do not have to show work. (28 points total)

θ	$\sin(\theta)$	$\cos(\theta)$	$\tan(\theta)$	$\sec(\theta)$
0				
$\frac{\pi}{6}$				
$\frac{\pi}{4}$				
$\frac{\pi}{3}$				
$\frac{\pi}{2}$				
xxx	xxxxxxxxxxx	xxxxxxxxxxx	xxxxxxxxxxx	xxxxxxxxxxx
$\frac{7\pi}{6}$				
$\frac{3\pi}{2}$				

7) Convert $\frac{\pi}{20}$ radians into degrees. (3 points)

8) Consider the Unit Circle. Which one of the following is a true identity for all real values of θ? Box in one. (2 points)

a) $\cos(\pi-\theta)=\cos(\theta)$

b) $\cos(\pi-\theta)=-\cos(\theta)$

c) $\cos(\pi-\theta)=\sin(\theta)$

9) Assuming that $\sin(\theta)>0$ and $\tan(\theta)<0$, what quadrant must θ lie in? (As usual, we consider angles in standard position.) Box in one: (2 points)

Quadrant I Quadrant II Quadrant III Quadrant IV

10) Complete the Identities. Fill out the table below so that, for each row, the left side is equivalent to the right side, based on the type of identity (ID) given in the last column. (10 points total)

Left Side	**Right Side**	**Type of Identity (ID)**
$\tan(\theta)$		Quotient ID
$\tan^2(\theta)+1$		Pythagorean ID
$1+\cot^2(\theta)$		Pythagorean ID
$\cos\left(\frac{\pi}{2}-\theta\right)$		Cofunction ID
$\cos(-\theta)$		Even / Odd (Negative-Angle) ID

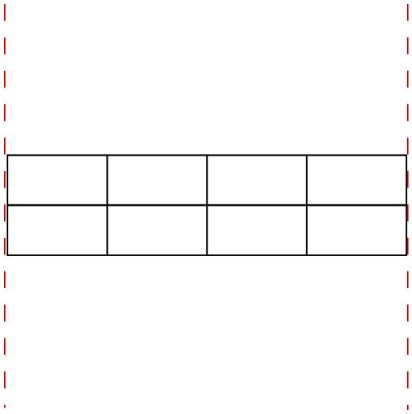
11) Fill out the table below. Use interval form (the form with parentheses and/or brackets) except where indicated. You do not have to show work. (24 points)

$f(x)$	Domain	Range
$\sin(x)$		
$\tan(x)$	Use set-builder form.	
$\cot(x)$	Use set-builder form.	
$\csc(x)$	Use set-builder form.	
$\cos^{-1}(x)$		
$\tan^{-1}(x)$		

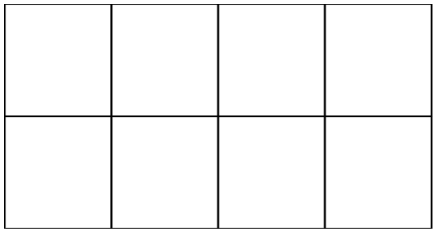
12) Evaluate $\cos\left(\frac{11\pi}{3}\right)$. (4 points)

13) Give the solutions for $\tan(\theta)=1$, where $0^\circ \le \theta < 360^\circ$. Give your answers in **degrees** and in solution set form. (4 points)

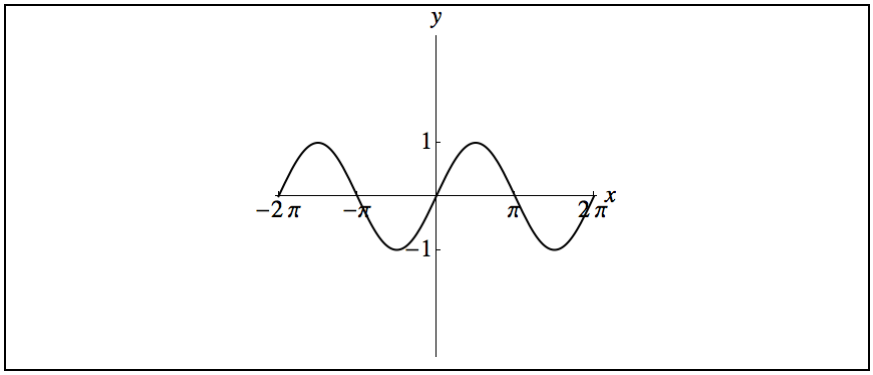
14) Graph one cycle of $y = -2\tan(4x)$. Simplify and clearly label all key x- and y-coordinates next to each corresponding grid line. Superimpose the x- and y-axes. If you do not use the frame, make sure you provide all required information. (10 points)



15) Graph one cycle of $y = 2\sin\left(3x - \frac{\pi}{2}\right) - 1$. Simplify and clearly label all key x- and y-coordinates next to each corresponding grid line. Superimpose the x- and y-axes. If you do not use the frame, make sure you provide all required information. (16 points)



16) The graph of $y=\sin(x)$ appears in the box below. Graph two cycles of the graph of $y=\csc(x)$ in the box below by using the graph of $y=\sin(x)$ as a guide. Draw vertical asymptotes as dashed lines where appropriate. (5 points)



17) Evaluate $\arcsin\left(-\frac{\sqrt{3}}{2}\right)$, also written as $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$. (2 points)

18) Evaluate $\arccos\left(-\frac{\sqrt{2}}{2}\right)$, also written as $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$. (2 points)

19) Evaluate $\arcsin\left(\sin\left(\frac{2\pi}{3}\right)\right)$, also written as $\sin^{-1}\left(\sin\left(\frac{2\pi}{3}\right)\right)$. (2 points)

20) Graph $y=\sin^{-1}(x)$. Draw in the *x*- and *y*-axes, and clearly indicate any endpoints and their corresponding coordinates. (6 points)