Math 141 Name: _____

MIDTERM 3 – PART 1

(CHAPTER 4)
INTRODUCTION TO TRIGONOMETRY; MATH 141 – FALL 2016 – KUNIYUKI
150 POINTS TOTAL: 34 FOR PART 1, AND 116 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 (34 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 circle has radius 6 meters. What is the arc length intercepted by a central angle of 2 radians? (3 points)

2) Give the solutions for $\sin(\theta) = 0.7$, 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). (3 points)

3) Give the solutions for $\tan(\theta) = -3$, 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). (5 points)

4) 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)

5) A very short desert nomad is flying a kite on a straight wire of length 58 feet. (Ignore the height of the nomad.) (16 points total)

   a) 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)

   b) Ten minutes later, the wind changes, and the kite is now 30 feet high above the ground. What is the angle of elevation from the nomad to the kite at that time? Round off your answer to the nearest tenth of a degree. (8 points)

Math 141 Name: _____

MIDTERM 3 – PART 2

(CHAPTER 4)
INTRODUCTION TO TRIGONOMETRY; MATH 141 – FALL 2016 – KUNIYUKI
150 POINTS TOTAL: 34 FOR PART 1, AND 116 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! (116 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
π				
$\frac{11\pi}{6}$				

7) Convert 70° into radians. (3 points)

8) If θ is an angle such that $\cos(\theta) > 0$ and $\sin(\theta) < 0$, what quadrant is θ in? (As usual, we consider angles in standard position.) Box in one. (2 points)

Quadrant I Quadrant II Quadrant III Quadrant IV

9) 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. (6 points total)

Left Side	**Right Side**	**Type of Identity (ID)**
$\cot(\theta)$		Quotient ID
$\tan^2(\theta)+1$		Pythagorean ID
$1+\cot^2(\theta)$		Pythagorean ID

10) The equation $y=-3\sin(-5x)$ has the same graph as which of the following? Box in one: $y=-3\sin(5x)$ $y=3\sin(5x)$. (2 points)

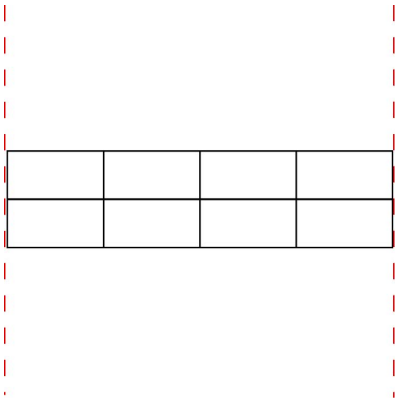
11) Evaluate $\sin\left(\frac{8\pi}{3}\right)$. (4 points)

12) Evaluate $\cot\left(-\frac{5\pi}{2}\right)$. (4 points)

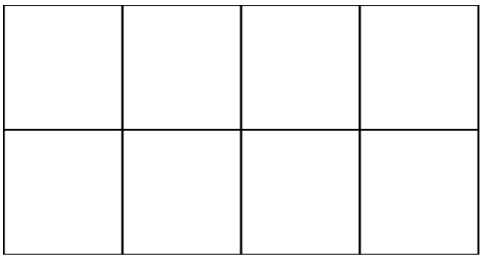
13) Fill out the table below. Use interval form (the form with parentheses and/or brackets) except where indicated. You do not have to show work. (24 points)

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

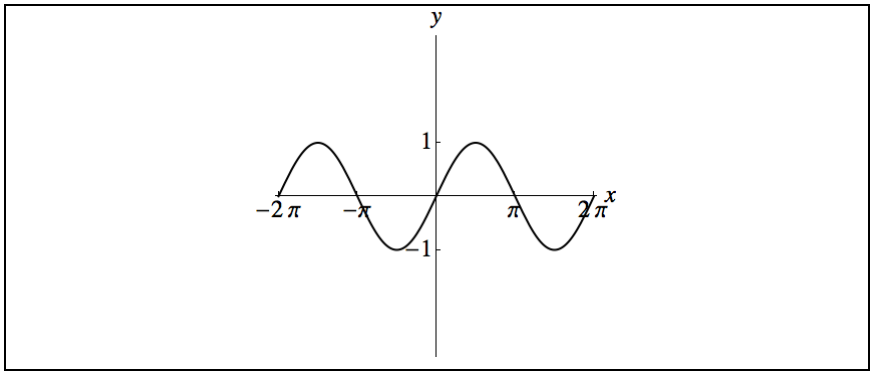
14) Graph one cycle of $y = 2\tan\left(\frac{1}{3}x\right)$ using the frame provided. Simplify and clearly label all key x- and y-coordinates next to each corresponding grid line. Superimpose the x- and y-axes. If you do not use the frame, make sure you provide all required information. (10 points)



15) Graph one cycle of $y = 4\cos\left(5x + \frac{\pi}{2}\right) - 3$ using the frame provided. 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 $y=\csc(x)$ 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 $\arccos\left(-\frac{1}{2}\right)$, also written as $\cos^{-1}\left(-\frac{1}{2}\right)$. (2 points)

18) True or False: $\tan\left(\arctan(3)\right)=3$. Box in one: True False . (2 points)

19) Evaluate $\arcsin\left(\sin\left(\frac{7\pi}{6}\right)\right)$, also written as $\sin^{-1}\left(\sin\left(\frac{7\pi}{6}\right)\right)$. (2 points)

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